

KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 2 of 2

DATE: Monday September 21st 2009

- Per Kevin, WSDOT will be on the job on 09/23 and 09/24/09 to core mix for gauge correlation factor. County core machine is out of service.
- Contractor set VMS signs on each end of project regarding road closure from 09/22 to 09/25/09. County installed temp. Signs informing about road closure.

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR(S) TIME: _____

INSPECTOR'S SIGNATURE: _____

**SE 416th Street Overlay:
Shingles in Paving Demonstration**

Construction Inspection and Quality Control Testing

Paving Day 1 (9-22-09)

**Inspectors Daily Report
HMA Test Results
HMA Mineral Aggregate Test Results
HMA Compaction Test Results**

KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 1 of 2

DATE: Tuesday September 22nd 2009

Federal Aid #

PROJECT NO. **M78030**

CONTRACT NO. **C00455C09**

PROJECT:

**SE 416th ST Overlay- Shingles in Paving
Demonstration**

INSPECTOR (S): **S.Shandil, M.Pavolka**

CONTRACTOR: **Woodworth & Company**

WEATHER: **Clear**

TEMP: High **80** Low **60**

WIND: Still ☒ Moderate ☒ High ☐

Workable **8** Nonworkable **0**

SIGNS AND TRAFFIC CONTROL CHECKED? Yes ☒ No ☐

ON-SITE INTERVIEW? Yes ☐ No ☒

WORK DONE:

- **Woodworth (Paving):** 6.20am Moby's sweeper on site to clean SE 416th. 7am Set up traffic control signs and flaggers on 244th ave and various cross streets on SE 416th st. Road closed between 244th and 228th ave. Crew Remove paper joint at 244th ave using J/D backhoe. 7.10 place tack on North side of SE 416th up to 236th ave. Mob. Equipment. 7.30 begin paving from st # 116+27 to 89+66. Luke operating shuttle buggy to transfer mix on to paver. Al operating Blaw Knox paver with Jonathan as screed operator. Shane using Sakai as b/down roller with Willie operating DD-110HF as intermediate/finish roller and the DD-28HF for side streets d/ways and towards end of day. 10.15 End paving at st# 89+66, place paper joint and continued on to pre level both side of SE 416th st# 89+60 to 80+00. 11.55 End pre level, mob equipment back to 244TH AVE. Waited for 45 min. before resuming paving South side. 12.20 Tack South side. 12.50 place water on mat North side to drop temp. Paver broke down- Diesel leak. Fixed paver, cleaned road and place more tack. 1.30 pave South side up to st#89+66. Continued on to prelevel North side of road from st# 78+50 to 70+50. End at 4pm. continued to roll. Mat temp. About 180 deg. Compaction hard to achieve. Use DD-28HF to get compaction. Placed temp tapes Road opened at 5pm. Flaggers continued to relocate detour signs for paving on 09/23/09. Done at 6pm.
- **Gloria Jeanne: (Grinding):** Complete on 09/21/09.

EQUIPMENT ON PROJECT:

- **Woodworth:** 1- F/M work truck(Chevy 2500HD), 1- Work truck (F 450 + Trailer # 38) 1 - Flagging truck(Chevy 2500 HD # 1264and 1262), 1 Back Hoe(JD 510 # 203), 1- Shuttle Buggy (SB- 2500B # 715), 1- Paver(Blaw Knox # 711), 3 Rollers(I.R DD-28HF # 841, I.R DD-110HF # 810, Sakai GW 750 # 822), Ken worth Water Truck # 26, Peter Bilt Tack Truck # 9
- **Gloria Jeanne:**
- **PERSONNEL ON PROJECT:**
- **Woodworth:** 1- Project Manager(Scott Droppelman), 1- F/M (Dan Andreas), 1- Paver operators(Al Anderson), 1- Shuttle buggy operator (Luke Dillard), 1 - Screed operator (Jonathan Pullack), 2 - Roller operators (Shane Thomas, Willie Guillen), 1- Truck spotter (Dave Thorton), 1 - Raker (Ludvig Yefimov), 1 - Tack Operator (), 1- TCS (Tara), 4- Flaggers(Glen, Katy, Ray and Paula)
- **Gloria Jeanne:**
- **King County:** Paul Moore, Kevin, Joe and Tim(Lab)
- **Others:** Warren (Enumclaw water district), Renay(CTL)

REMARKS:

- Road closed between 244th ave and 228th ave. Flaggers at each major crossing to stop cars entering in to work zone from 7am to 5pm.
- Used Sakai as break down roller, DD-110 as intermediate roller on 4 vibes. And 2 static rolling pattern and DD-28 for Side Street / driveways and to get compaction on the South side towards end of day.
- It seems that the rubber tires on Sakai were not warm enough in Morning. It was picking up mix which resulted in oil spots from St#113 + 00 to 111+50 on the North Side. Notified f/man. Stopped at st# 111+50 to clean rubber tires.

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____

**KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 2 of 2**

DATE: Tuesday September 22nd 2009

- Temperature of laid down mix ranged from 270 deg. To 300deg. outside temp. was in the mid 80deg. This affected compaction on the South side.
- Paver had Diesel leak at st # 115+90 to 116+27 on the South side.
- Pre level on the North side from st # 89+60 (0" at centre to 5" at edge) to st # 83+50(0" at centre to 6"at edge) and stopped at 80+00 (0" at centre to 3" at edge), Skipped bridge section and pre level North side from 78+70 to 70+50(0" at centre to 2" at edge). Pre level South side from st # 88+00(0" at centre to 5" at edge) to 83+50(0" at centre to 5" at edge) and stopped at 80+00(0" at centre to 2" at edge)
- Sakai broke down and could not be used on the South side from st # to st # 114+50. Used DD-110HF as break down and intermediate roller. Sakai back in service from st # 114+50.
- Advised Joe (Lab) to take compaction shots in between wheel ruts.
- Day 1 Paving was from station 116+27 to 89+66. Wood Worth haul mix from Lake View plant using 15 truck and trailers. Placed 971.42T of HMA Class ½" PG 64-22 with 15% Rap on Se 416th st at 2" compacted. Placed 227.19 T of same mix as prelevel on SE 416TH ST.
- All trucks came in with covered loads.
- Temp. of mix was 290 deg at 116+27, 270deg at 109+00,290deg at 100+00,295 deg at 95+00. Temperature stayed within 5 deg. of 295deg. For rest of day.

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____



**King County
HMA Test Results**

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/22/09 @ 7:47 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1217** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	94	90	to 100
3/8"	82	78	to 90
#4	58		to
#8	39	35	to 43
#16	26		to
#30	18		to
#50	12		to
#100	9		to
#200	5.9	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	3.5	2.5	to 5.5
% VMA @ Ndes	13.9	12.5	to N/A
% VFA @ Ndes	74.8	65	to 75
Dust/Asphalt Ratio	1.3	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.485		154.7 lb/ft³
Gmb (ASTM D2726)	2.399		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			5.3
% Water (WSDOT FOP for AASHTO T 329)	0.27		2.0 max

Mix Temperature in °F **332**
Oil Temperature in °F **330**
Air Temperature in °F **54**

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0	Gb (Binder)	1.028
Asphalt Content Design		5.6%		Mixing Temperature in °F	313
Anti Strip		0.00%		Compaction Temperature in °F	291
Pbe		4.5		Number of Gyration @ Initial	8
Gsb (Aggregate Blend)		2.64		Number of Gyration @ Design	100
Gsb (Fine Aggregate)		2.599		ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #10069T, ticket #244759. This truck was the 13th load of the day. The accumulative tonnage was 417.50. This is the first of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

X meets
Material _____ fails to meet

above specifications.

Approved for
Distribution By:

Materials Engineer

Date

Tested and
Submitted by:

TEP 9/22/2009

Initial

Date

Copies Distribution
2 Resident Engr.
1 Const. Admin.
1 Dens. Engineer

Kevin G. W. 10/9/09



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
 Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
 Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
 Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/22/09 @ 7:47 AM**
 Mix ID: **MD090088** Sample ID: **KC-09-1217** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	9:10	10:40	11:15		
Tare Weight	541.5	541.5	541.5		
Sample + Tare Wt.	1141.0	1139.5	1139.4	Mass (Wt.) H ₂ O	1.6
Sample Weight	599.5	598.0	597.9	Percent H ₂ O	0.27

Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3057.8	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4600.2	Actual Asphalt Content in %:	5.3
Mass of Sample:	1542.4		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	6.30	Mass of Residual Agg. & Basket:	4504.3
Temperature Compensation (Ticket) in %:	0.19	Mass of Residual Agg. (Direct):	1446.5
Calibrated Asphalt Content (Ticket) in %:	5.58	Mass of Residual Agg. (Ticket):	1448.2
Difference of Masses of Residual Aggregate - Direct vs. Ticket = 0.1% Specification: shall be within $\pm 0.1\%$.			

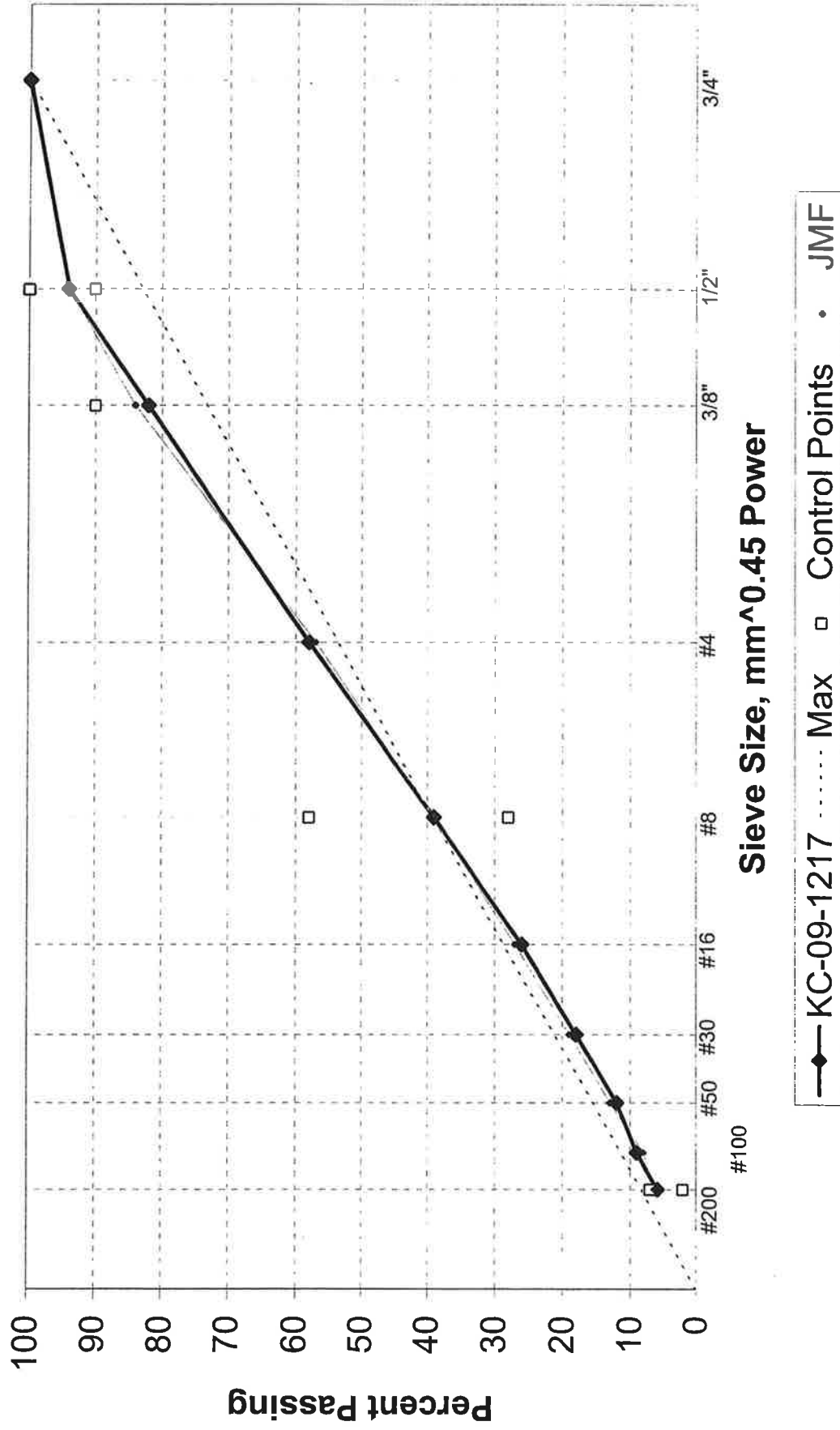
Sieve Analysis (AASHTO T30)							
Mass of Dry Washed Residual Aggregate:		1369.9					
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	92.6	94	94	90	100	90	100
3/8"	253.7	82	84	78	90	0	90
#4	612.0	58	57				
#8	889.1	39	39	35	43	28	58
#16	1063.6	26	27				
#30	1183.2	18	19				
#50	1265.7	12	13				
#100	1320.7	9	8				
#200	1361.2	5.9	6.3	4.3	7.0	2.0	7.0
Pan	1369.7						

Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$

Remarks: **Bold = Within Tolerance Limits** *Black Italic - At Tolerance Limit* Red = Outside Tolerance Limit
 Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #10069T, ticket #244759. This truck was the 13th load of the day. The accumulative tonnage was 417.50. This is the first of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material **X** meets _____ fails to meet _____ above specifications.

1/2 Inch HMA



KC-09-1217

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	332
Collection Date/Time	9/22/09 @ 7:47 AM	Oil Temp	330
Sample ID	KC-09-1217	Air Temp	54

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	4800.0		
Height in mm of Sample @ Initial Gyrations	127.3	8	Compaction Temp. = 291
Height in mm of Sample @ Design Gyrations	115.5	100	

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3057.8	Percent Loss (Ticket) in %:	6.30	
Mass of Basket & Sample	4600.2	Temp. Comp. (Ticket) in %:	0.19	Oil:
Sample Weight	1542.4	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4504.3	5.3

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	541.5	:	Min. test sample 500g.	
Sample + Tare Wt.	1141.0	Time	9:10	163 +/- 14° C for the oven temp.
Sample + Tare Wt.	1139.5	After 90 min.	10:40	Moist %:
Sample + Tare Wt.	1139.4	After 120 min.	11:15 (Use Military Time, ex. 00:00)	0.27

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1683.7			
Mass of Pycnometer Under Water @ 25.0 °C	1277.5			
Pycnometer Calibration @ 77°F				
Mass of Sample & Pycnometer Under Water	2283.6			
Temperature of Water 25.0 ± 1.0 °C	24.8			
			Min. Mass	RICE:
			1/2"	1500g
			3/4"	2000g
			1"	2500g
				154.7

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample 1369.9

1 1/2"	#8	889.1
1"	#16	1063.6
3/4"	#30	1183.2
1/2"	#50	1265.7
3/8"	#100	1320.7
#4	#200	1361.2
Pan		1369.7

Weight in Air	4789.3
Weight in Water	2797.3
Weight SSD	4793.6
Temp 25.0 ± 1.0 °C	25.1

HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1217** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			5.3
% Pass #200 Sieve			5.9
Gmm (Rice Specific Gravity)			2.485
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4800.0
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1683.7
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2283.6
(R) Temperature of Water in °C			24.8
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			1.00005
(V) Gmm @ 25°C = $N \cdot U / (N - (Q - O))$			2.485
(W) Density @ 25°C = $V \cdot 62.245 \text{ lb/ft}^3$			154.7
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4789.3
B = Mass in Grams of Surface-Dry Specimen in Air			4793.6
C = Mass in Grams of Specimen in Water			2797.3
Temperature of the Water °C			25.1
D = Temperature Correction for Density of Water			1.0000
Gmb = $D \cdot A / (B - C)$		(nearest 0.001)	2.399
Absorption = $((B - A) / (B - C)) \cdot 100$		(nearest 0.001)	0.215%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			127.3
H @ Ndes (Height of Sample @ Design Gyration)			115.5
% Gmm @ N ini = $(H_{des} \cdot G_{mb}) / (H_{ini} \cdot G_{mm}) \cdot 100$		(nearest 0.1)	87.6
% Gmm @ N des = $(G_{mb}) / (G_{mm}) \cdot 100$		(nearest 0.1)	96.5
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
Va = $100 \cdot (1 - (G_{mb} / G_{mm}))$	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	3.5
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
VMA = $100 \cdot (1 - (G_{mb} \cdot P_s / (G_{sb} \cdot 100)))$	Mix Criteria = Min. 14.0%	(nearest 0.1)	13.9
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
VFA = $100 \cdot [(VMA - Va) / VMA]$	Mix Criteria = 65 to 75	(nearest 0.1)	74.8
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
Gse = $(100 - Pb) / [(100 / G_{mm}) - (Pb / G_b)]$		(nearest 0.001)	2.699
Pbe = $-(P_s \cdot G_b) \cdot (G_{se} - G_{sb}) / (G_{se} \cdot G_{sb}) + Pb$		(nearest 0.1)	4.5
P _s = 100 - Pb		(nearest 0.1)	94.7
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.3



Mix Design Requirements and Specifications

Project:	SE 416th St Overlay, Shingles in Paving Demo.	Project Number:	M78030
Contractor:	Woodworth & Co.	Contract Number:	C004555C09
Asphalt Supplier:	Woodworth Lakesview	Mix ID:	MD090088
Oil Source:	U.S. Oil	HMA Class:	1/2"
		Resident Engineer:	Frank Overton

Gradation							
Sieve Size	Contractor JMF		Tolerances		Control Points		
	% Passing		*LL	*UL	Class 1/2"		
					LL		UL
1 1/2"							
1"							
3/4"	100		99	100	100		100
1/2"	94		90	100	90		100
3/8"	84		78	90	0		90
#4	57		52	62			
#8	39		35	43	28		58
#16	27						
#30	19						
#50	13						
#100	8						
#200	6.3		4.3	7.0	2.0		7.0

Aggregate Source (Pit #)	B-333	B-160					
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to	<30		
% Asphalt Content Design	5.6		5.1%	to	6.1%		
% Anti Strip	0.00						
% Water					2% max		
% Va @ Ndes	C 3.7		2.5	to	5.5		
% VMA @Ndes	C 14.3		14	to	N/A		
% VFA @ Ndes	C 74		65	to	75		
Dust/Asphalt Ratio	C 1.4		0.6	to	1.6		
Pbe	C 4.5						
Gmm	S 2.463	SE Specification			45		
Gmb	S 2.374	Fracture	Single face		90%		
			Double face				
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity			44% min.		
Gsb (Fine Aggregate)	S 2.599						
Gb (Binder)	S 1.028						
Mixing Temperature in °F	313						
Max. Mixing Temperature in °F	350						
Compaction Temperature in °F	291						
Number of Gyrations @ Initial	8						
Number of Gyrations @ Design	100						
Number of Gyrations @ Max.	160						

Copies	Distribution
2	Resident Engr.
1	Const. Admin.

*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



**King County
HMA Test Results**

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/22/09 @ 12:29 PM**
Mix ID: **MD090088** Sample ID: **KC-09-1221** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	95	90	to 100
3/8"	83	78	to 90
#4	55		to
#8	36	35	to 43
#16	25		to
#30	18		to
#50	12		to
#100	9		to
#200	5.9	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	3.0	2.5	to 5.5
% VMA @Ndes	13.8	12.5	to N/A
% VFA @ Ndes	78.3	65	to 75
Dust/Asphalt Ratio	1.3	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.483		154.6 lb/ft³
Gmb (ASTM D2726)	2.409		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			5.5
% Water (WSDOT FOP for AASHTO T 329)	0.17		2.0 max

Mix Temperature in °F **312**
Oil Temperature in °F **330**
Air Temperature in °F **81**

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0	Gb (Binder)	1.028
Asphalt Content Design		5.6%		Mixing Temperature in °F	313
Anti Strip		0.00%		Compaction Temperature in °F	291
Pbe		4.5		Number of Gyrations @ Initial	8
Gsb (Aggregate Blend)		2.64		Number of Gyrations @ Design	100
Gsb (Fine Aggregate)		2.599		ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tara Pfaff. A companion ssmples was taken by Woodworth. Sample was obtained from truck #80-180, ticket #244856. This truck was the 23rd load of the day. The accumulative tonnage was 742.58. This is the second of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

X

meets

Material

above specifications.

fails to meet

Copies Distribution

2 Resident Engr.
1 Const. Admin.
1 Dens. Engineer

Approved for
Distribution By:

Tested and
Submitted by:

TEP 9/22/2009

Materials Engineer

Date

Initial Date

Victor G. New
10/7/09



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/22/09 @ 12:29 PM**
Mix ID: **MD090088** Sample ID: **KC-09-1221** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	1:51	3:33	4:02		
Tare Weight	513.2	513.2	513.2		
Sample + Tare Wt.	1220.4	1219.5	1219.2	Mass (Wt.) H ₂ O	1.2
Sample Weight	707.2	706.3	706.0	Percent H ₂ O	0.17

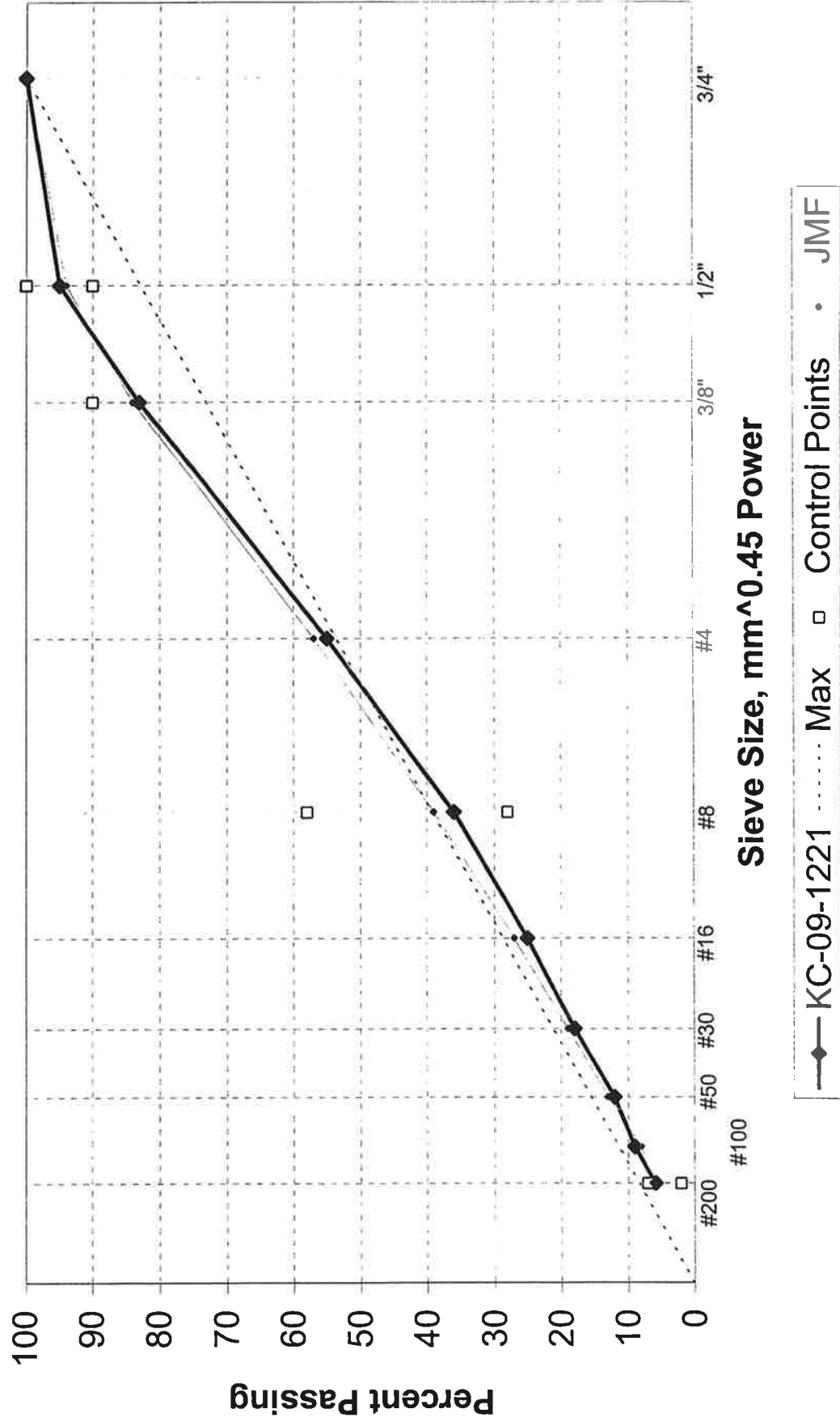
Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3021.7	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4643.7	Actual Asphalt Content in %:	5.5
Mass of Sample:	1622.0		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	6.40	Mass of Residual Agg. & Basket:	4544.3
Temperature Compensation (Ticket) in %:	0.18	Mass of Residual Agg. (Direct):	1522.6
Calibrated Asphalt Content (Ticket) in %:	5.69	Mass of Residual Agg. (Ticket):	1521.1
Difference of Masses of Residual Aggregate - Direct vs. Ticket = -0.1% Specification: shall be within $\pm 0.1\%$.			

Sieve Analysis (AASHTO T30)							
Mass of Dry Washed Residual Aggregate:		1439.5					
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	77.3	95	94	90	100	90	100
3/8"	258.4	83	84	78	90	0	90
#4	690.6	55	57				
#8	969.4	36	39	35	43	28	58
#16	1140.1	25	27				
#30	1252.9	18	19				
#50	1338.2	12	13				
#100	1393.1	9	8				
#200	1432.4	5.9	6.3	4.3	7.0	2.0	7.0
Pan	1439.5						
Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$							

Remarks: **Bold = Within Tolerance Limits** *Black Italic - At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #80-180, ticket #244856. This truck was the 23rd load of the day. The accumulative tonnage was 742.58. This is the second of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material **X** meets _____ fails to meet _____ above specifications.

1/2 Inch HMA



KC-09-1221

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	312
Collection Date/Time	9/22/09 @ 12:29 PM	Oil Temp	330
Sample ID	KC-09-1221	Air Temp	81

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	4800.0		
Height in mm of Sample @ Initial Gyration	127.3	8	Compaction Temp. = 291
Height in mm of Sample @ Design Gyration	115.3	100	

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3021.7	Percent Loss (Ticket) in %:	6.40	
Mass of Basket & Sample	4643.7	Temp. Comp. (Ticket) in %:	0.18	Oil:
Sample Weight	1622.0	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4544.3	5.5

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	513.2	:	Min. test sample 500g.	
Sample + Tare Wt.	1220.4	Time	1:51	163 +/- 14° C for the oven temp.
Sample + Tare Wt.	1219.5	After 90 min.	3:33	Moist %:
Sample + Tare Wt.	1219.2	After 120 min.	4:02 (Use Military Time, ex. 00:00)	0.17

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1547.7			
Mass of Pycnometer Under Water @ 25.0 °C	1277.5			
Pycnometer Calibration @ 77°F				
Mass of Sample & Pycnometer Under Water	2201.8			
Temperature of Water 25.0 ± 1.0 °C	25.1			

	Min. Mass	
1/2"	1500g	
3/4"	2000g	
1"	2500g	

	RICE:
154.6	

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample 1439.5

1 1/2"		#8	969.4
1"		#16	1140.1
3/4"	0.0	#30	1252.9
1/2"	77.3	#50	1338.2
3/8"	258.4	#100	1393.1
#4	690.6	#200	1432.4
Pan			1439.5

Weight in Air	4788.5
Weight in Water	2803.6
Weight SSD	4791.4
Temp 25.0 ± 1.0 °C	25.1

HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1221** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			5.5
% Pass #200 Sieve			5.9
Gmm (Rice Specific Gravity)			2.483
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4800.0
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1547.7
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2201.8
(R) Temperature of Water in °C			25.1
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			0.99997
(V) Gmm @ 25°C = N*U/(N-(Q-O))			2.483
(W) Density @ 25°C = V*62.245 lb/ft ³			154.6
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4788.5
B = Mass in Grams of Surface-Dry Specimen in Air			4791.4
C = Mass in Grams of Specimen in Water			2803.6
Temperature of the Water °C			25.1
D = Temperature Correction for Density of Water			1.0000
Gmb = D A / (B-C)		(nearest 0.001)	2.409
Absorption = ((B-A) / (B-C))*100		(nearest 0.001)	0.146%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			127.3
H @ Ndes (Height of Sample @ Design Gyration)			115.3
% Gmm @ N ini = (Hdes*Gmb)/(Hini*Gmm)*100		(nearest 0.1)	87.9
% Gmm @ N des = (Gmb)/(Gmm)*100		(nearest 0.1)	97.0
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
Va = 100 *(1-(Gmb/Gmm))	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	3.0
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
VMA = 100 *(1-(Gmb*Ps/(Gsb*100)))	Mix Criteria = Min. 14.0%	(nearest 0.1)	13.8
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
VFA = 100 * [(VMA - Va) / VMA]	Mix Criteria = 65 to 75	(nearest 0.1)	78.3
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
Gse = (100 - Pb) / [(100 / Gmm) - (Pb / Gb)]		(nearest 0.001)	2.706
Pbe = -(Ps*Gb)*(Gse-Gsb)/(Gse*Gsb)+Pb		(nearest 0.1)	4.6
Ps = 100 - Pb		(nearest 0.1)	94.5
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.3



Mix Design Requirements and Specifications

Project: SE 416th St Overlay, Shingles in Paving Demo.	Project Number: M78030
Contractor: Woodworth & Co.	Contract Number: C004555C09
Asphalt Supplier: Woodworth Lakesview	Mix ID: MD090088 HMA Class: 1/2"
Oil Source: U.S. Oil	Resident Engineer: Frank Overton

Gradation

Sieve Size	Contractor JMF % Passing	Tolerances		Control Points Class 1/2"	
		*LL	*UL	LL	UL
1 1/2"					
1"					
3/4"	100	99	100	100	100
1/2"	94	90	100	90	100
3/8"	84	78	90	0	90
#4	57	52	62		
#8	39	35	43	28	58
#16	27				
#30	19				
#50	13				
#100	8				
#200	6.3	4.3	7.0	2.0	7.0

Aggregate Source (Pit #)	B-333	B-160		
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to <30
% Asphalt Content Design	5.6		5.1%	to 6.1%
% Anti Strip	0.00			
% Water				2% max
% Va @ Ndes	C 3.7		2.5	to 5.5
% VMA @Ndes	C 14.3		14	to N/A
% VFA @ Ndes	C 74		65	to 75
Dust/Asphalt Ratio	C 1.4		0.6	to 1.6
Pbe	C 4.5			
Gmm	S 2.463	SE Specification		45
Gmb	S 2.374	Fracture	Single face	90%
			Double face	
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity		44% min.
Gsb (Fine Aggregate)	S 2.599			
Gb (Binder)	S 1.028			
Mixing Temperature in °F	313			
Max. Mixing Temperature in °F	350			
Compaction Temperature in °F	291			
Number of Gyrations @ Initial	8			
Number of Gyrations @ Design	100			
Number of Gyrations @ Max.	160			

Copies	Distribution
2	Resident Engr.
1	Const. Admin.

*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



HMA Mineral Aggregate Results

Project: **SE 416th St Overlay** Project Number: **M78030**
Contractor: **Woodworth** Contract Number: **C00455C09**
Name of Source: **Miles Sand and Gravel Roy Pit** Sampling Location: **Plant/Belt**
Lab Sample Number: **KC-09-1222** Collection Date: **9/22/2009 @ Afternoon**
Mix ID: **MD090088** Pit #: **B-333** Sampled By: **TEP** HMA Class: **1/2"**

Sand Equivalent Test (AASHTO T-176)

SE Value = $\frac{\text{Sand Reading (100)}}{\text{Clay Reading}}$

Clay Reading	Sand Reading	SE Value
5.8	3.6	63
Specification =		45 Min.

Percentage of Fracture in Course Aggregate (AASHTO TP-61)

P = Percent of fracture

Q = Mass of questionable particles or borderline particles

F = Mass of fractured particles

N = Mass of unfractured particles

$$P = \left[\frac{F + \left(\frac{Q}{2} \right)}{F + Q + N} \right] * 100$$

Sieve Size	F	Q	N	P
1"				
3/4"				
1/2"	83.0	0.0	3.5	96
3/8"	279.4	0.0	15.3	95
#4	50.0	0.0	0.0	100

Specification = Single Face = 90 % Double Face =

Uncompacted Void Content of Fine Aggregate (AASHTO T-304)

V = Volume of cylindrical measure, ml

G = Bulk dry specific gravity fine agg. (G_b)

F = Net mass, g, of fine aggregate in measure

U = Uncompacted voids, percent, in the material

Preparation of Test Sample

Sieve Size	Mass
#8 - #16	44 +/- 0.2 g
#16 - #30	57 +/- 0.2 g
#30 - #50	72 +/- 0.2 g
#50 - #100	17 +/- 0.2 g
Specification	44 Min.

Tare

185.64

$$U = \left[\frac{V - \left(\frac{F}{G} \right)}{V} \right] * 100$$

V	F	G	U
100.0	138.22	2.599	46.8
100.0	138.78	2.599	46.6
Average			47

Remarks:

Material

X meets

above specifications.

fails to meet

Copies Distribution

2 Resident Engr.

1 Const. Admin.

Approved for
Distribution By:

Tested and
Submitted by:

LKW

9/24/2009

Materials Engineer

Date

Initial

Date



King County

Hot Mix Asphalt Compaction Form

Date	9/22/09	Project	416th RAS Study				No.	Section		Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview			
Class	1/2"	Lift	Wearing	Start Air Temp.	50	End Air Temp.	92	Gauge	Troxler 4640B #2659							Mix I.D.	MD090088	Rand. #
Estimated Density (p) =			0.0759 Tons/ft ³			Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)		200 Tons	Enumclaw		ACP Test Temp.		Lot Length to nearest 100' (A) =	1190ft
Beg. Sta.	116+00 + 105+85			Sublot Ln. [(A) x 0.2] = (L)			238ft	Sta. to Sta.	Loc.		ACP Test Temp.		Lot #		1			

Test	Location Code	Test Location	Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #4	115+45	4'RT	0.17	145.3	144.0	144.7	1.007	145.7	154.6	94.2
2	Section #4	113+25	6'RT	0.17	144.8	145.5	145.2	1.007	146.2	154.6	94.5
3	Section #4	110+50	8.5'RT	0.17	144.6	146.5	145.6	1.007	146.6	154.6	94.8
4	Section #4	108+75	4'RT	0.17	143.8	143.1	143.5	1.007	144.5	154.6	93.4
5	Section #4	105+85	9'RT	0.17	143.8	144.6	144.2	1.007	145.2	154.6	93.9
Lot Avg.										94.2	

Estimated Density (p) =			0.0759 Tons/ft ³			Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)		200 Tons	Vol. of ACP in Sublot (V) =		Lot Length to nearest 100' (A) =		1190ft	
Beg. Sta.	102+90 + 92+50			Sublot Ln. [(A) x 0.2] = (L)			238ft	Sta. to Sta.	Loc.		ACP Test Temp.		Lot #		2			

Test	Location Code	Test Location	Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #4	102+90	3.5'RT	0.17	142.5	142.5	142.5	1.007	143.5	154.6	92.8
2	Section #4	100+00	2.5'RT	0.17	143.1	142.5	142.8	1.007	143.8	154.6	93.0
3	Section #4	97+60	6.5'RT	0.17	145.4	144.4	144.9	1.007	145.9	154.6	94.4
4	Section #4	95+05	10.5'RT	0.17	144.1	144.2	144.2	1.007	145.2	154.6	93.9
5	Section #4	92+50	3'RT	0.17	142.4	142.8	142.6	1.007	143.6	154.6	92.9
Lot Avg.										93.4	

Field tests performed using KCDOT Test Method N-1.

Pavers:	Blaw Knox PF-5510 #711
Remarks:	Woodworth paved section #4 on the plan sheet. They planned to do 950 tons plus a smaller amount of prelevel for the paving to be done on 9-23-09. The asphalt placed today had 15% RAP and 0% RAS.
Rollers	Breakdown Sakal GW 750 P
Intermediate	IR 110 HF DDV
Passes	4 Vibe 2-3 Static
Roller Codes:	SDV - Single Drum Vibrator DDV Double Drum Vibrator TS - Tandem Steel
	P-Pneumatic

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009



King County Hot Mix Asphalt Compaction Form

Date	9/22/09	Project	416th RAS Study				No.	Section	Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview
Class	1/2"	Lift	Wearing	Start Air Temp.	50	End Air Temp.	92	Gauge	Troxler 4640B #2659		Mix I.D.	MD090088	Plant	Rand. #
Estimated Density (p) =		0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons	Loc.	Enumclaw	ACP Test Temp.	Lot Length to nearest 100' (A) = = $\sqrt[3]{(p^3) / W(ft) \times D(ft)}$ =	
Beg. Sta.	+	Sublot Ln. [(A) x 0.2] = (L)	238ft	Sta. to Sta.										
Test	Location Code	Test Location			Offset	Depth	Gauge Readings			Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #4	91+30		7' RT	0.17	144.5	146.5		145.5	1.007	146.5	154.6	94.8	
2	Section #4	115+60		9.5' LT	0.17	143.7	144.1		143.9	1.007	144.9	154.6	93.7	
3	Section #4	113+00		4' LT	0.17	142.7	142.4		142.6	1.007	143.5	154.6	92.9	
4	Section #4	110+90		6' LT	0.17	144.9	143.4		144.2	1.007	145.2	154.6	93.9	
5	Section #4	108+40		9' LT	0.17	141.1	140.6		140.9	1.007	141.8	154.6	91.7	
Estimated Density (p) = 0.0759 Tons/ft ³ Width (W) = 13ft Depth (D) = 0.17ft Beg. Sta. 102+90 + 92+50 Sublot Ln. [(A) x 0.2] = (L) 238ft Sta. to Sta. Sublot Size (S) 200 Tons Loc. Enumclaw Vol. of ACP in Sublot (V) = = $\sqrt[3]{(p^3) / W(ft) \times D(ft)}$ = 2635.0 ft ³ ACP Test Temp. Lot Avg. 93.4														
Test	Location Code	Test Location			Offset	Depth	Gauge Readings			Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #4	106+10		3' LT	0.17	141.8	143.7		142.8	1.007	143.7	154.6	93.0	
2	Section #4	103+35		6' LT	0.17	141.5	143.1		142.3	1.007	143.3	154.6	92.7	
3	Section #4	100+65		8.5' LT	0.17	145.7	145.0		145.4	1.007	146.4	154.6	94.7	
4	Section #4	98+75		6.5' LT	0.17	144.7	142.0		143.4	1.007	144.4	154.6	93.4	
5	Section #4	96+50		5' LT	0.17	144.0	142.9		143.5	1.007	144.5	154.6	93.4	
Field tests performed using KCDOT Test Method N-1. Lot Avg. 93.4														
Pavers: Blaw Knox PF-5510 #711 Remarks: Woodworth paved the westbound lane which is test section #4 on the plan sheet. They planned to do 950 tons plus a small amount of prelevel for the paving to be done on 9-23-09. The asphalt placed today had 15% RAP and 0% RAS.														
Rollers		Breakdown		Intermediate										
		Sakal GW 750		IR 110 HF										
		P		DDV										
Passes		4 Vibe		4 Vibe										
		2-3 Static												
Roller Codes: SDV - Single Drum Vibrator P-Pneumatic DDV Double Drum Vibrator TS - Tandem Steel														

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009



King County Hot Mix Asphalt Compaction Form

155 Monroe Avenue NE, Bldg. D,
Renton, WA 98056-4199
Phone: (206) 296-7709
Fax: (206) 296-0179

Date	9/22/09	Project	416th RAS Study				No.	Section	Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview	
Class	1/2"	Lift	Wearing	Start Air Temp.	50	End Air Temp.	92	Gauge	Troxler 4640B #2659					Woodworth	Plant
Estimated Density (p) =		0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons		2635.0 ft ³		Lot Length to nearest 100' (A) = V(ft ³) / W(ft) x D(ft) =		
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft	Sta. to Sta.	Enumclaw		ACP Test Temp.		Lot #		5		
Test	Location Code		Test Location		Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice		
1	Section #4		94+15		7.5' LT	0.17	144.0	143.1	143.6	1.007	144.6	154.6	93.5		
2	Section #4		92+05		4' LT	0.17	142.5	143.6	143.1	1.007	144.1	154.6	93.2		
3	Section #4		90+10		8' LT	0.17	145.3	146.6	146.0	1.007	147.0	154.6	95.1		
4															
5															
<div>Estimated Density (p) = 0.0759 Tons/ft³ Width (W) = Depth (D) = Sublot Size (S) = Vol. of ACP in Sublot (V) =</div> <div>Lot Length to nearest 100' (A) =</div> <div>Lot Avg. 93.9</div>															
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft	Sta. to Sta.	Loc.		ACP Test Temp.		Lot #				
Test	Location Code				Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice		
1															
2															
3															
4															
5															
<div>Field tests performed using KCDOT Test Method N-1.</div> <div>Lot Avg.</div>															

Pavers: Blaw Knox PF-5510 #711	
Remarks: Woodworth paved the westbound lane which is test section #4 on the plan sheet. They planned to do 950 tons plus a small amount of prelevel for the paving to be done on 9-23-09. The asphalt placed today had 15% RAP and 0% RAS.	
Rollers	Breakdown Sakal GW 750 P
Passes	4 Vibe
Intermediate IR 110 HF DDV	
2-3 Static	

Roller Codes: SDV - Single Drum Vibrator P-Pneumatic
DDV Double Drum Vibrator TS - Tandem Steel

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009

**SE 416th Street Overlay:
Shingles in Paving Demonstration**

Construction Inspection and Quality Control Testing

Paving Day 2 (9-23-09)

**Inspectors Daily Report
HMA Test Results
HMA Mineral Aggregate Test Results
HMA Compaction Test Results**

KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 1 of 2

DATE: Wednesday September 23rd 2009

Federal Aid #

PROJECT NO. **M78030**

CONTRACT NO. **C00455C09**

PROJECT:

**SE 416th ST Overlay- Shingles in Paving
Demonstration**

INSPECTOR (S):

S. Shandil, M. Pavolka

CONTRACTOR:

Woodworth & Company

WEATHER:

Clear

TEMP: High 80 Low 60

WIND:

Still ☒

Moderate ☒

High ☐

Workable 8 Nonworkable 0

SIGNS AND TRAFFIC CONTROL CHECKED?

Yes ☒

No ☐

ON-SITE INTERVIEW? Yes ☐

No ☒

Work DONE:

- **Woodworth (Paving):** 7am Set up traffic control signs and flaggers on SE 416th st. Road closed between 236th and 2000' East of 212th ave. Crew Remove paper joint at 236th ave using J/D backhoe. 7.10 place tack on North side of SE 416th from st# 89+66 to 63+10 at 228th ave. Mob. Equipment. 7.30 begin paving from st # 89+66 to 63+10. Luke operating shuttle buggy to transfer mix on to paver. Al operating Blaw Knox paver with Jonathan as screed operator. Shane using Sakai as b/down roller with Willie operating DD-110HF as intermediate/finish roller and the DD-28HF for side streets d/ways. 9.20 End paving at st# 63+10, place paper joint. Waited for 2hrs, mob. Equipment back to 236th. Place water to drop mat temp. on the North side. 11.30 pave South side up to st#63+10 End paving at 1.40 pm, had about 25tons mix in shuttle buggy. Pre level North and South side of road to cover county prep. Work. End at 2.15pm. Continued with compaction. Placed temp tapes, place water to drop mat temp. Road opened at 3.30pm. Flaggers continued to relocate detour signs for paving on 09/24/09. Done at 4.30pm.
- **Gloria Jeanne: (Grinding):** Complete on 09/21/09.

EQUIPMENT ON PROJECT:

- **Woodworth:** 1- F/M work truck(Chevy 2500HD), 1- Work truck (F 450 + Trailer # 38) 1 – Flagging truck(Chevy 2500 HD # 1264 and 1262), 1 Back Hoe(JD 510 # 203), 1- Shuttle Buggy (SB- 2500B # 715), 1- Paver(Blaw Knox # 711), 3 Rollers(I.R DD-28HF # 841, I.R DD-110HF # 810, Sakai GW 750 # 822 Pneumatic Roller), Ken worth Water Truck # 26, Peter Bilt Tack Truck # 9
- **Gloria Jeanne:**
- **PERSONNEL ON PROJECT:**
- **Woodworth:** 1- Project Manager(Scott Droppelman), 1- F/M (Dan Andreas), 1- Paver operators(Al Anderson), 1- Shuttle buggy operator (Luke Dillard), 1 – Screed operator (Jonathan Pullack), 2 – Roller operators (Shane Thomas, Willie Guillen), 1- Truck spotter (Dave Thorton), 1 – Raker (Ludvig Yefimov), 1 – Tack Operator (), 1- TCS (Tara), 4- Flaggers(Glen, Katy, Ray and Paula)
- **Gloria Jeanne:**
- **King County:** Paul Moore, Kevin, Joe(Lab), Matt Reichmann(Video person), Kris Beatty (DNR), Michelle Caulfield(Consultant)
- **Others:** Warren (Enumclaw water district), Joe Devol(WSDOT), Herb(WSDOT)

REMARKS:

- Road closed between 236Th ave and 2000' East of 212th ave. Flaggers at each major crossing to stop cars entering in to work zone from 7am to 5pm.
- Used Sakai as break down roller on 6 vibes, DD-110 as intermediate roller on 4 vibes, 2 static rolling pattern and DD-28 for Side Street / driveways.
- Temperature of laid down mix ranged from 270 deg. To 300deg. Outside air temp. Was in the mid 80deg.
- Pre level on the North side from st # 63+00 to 54+00 (0" at centre to 1/2" at edge) and South side from st # 63+00 to 54+00 (0" at centre to 1/2" at edge).

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____

**KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 2 of 2**

DATE: **Wednesday September 23rd 2009**

- Day 2 Paving was from station 89+66 to 63+10. Wood Worth haul mix from Lake View plant using 15 truck and trailers. Placed 933.85 Tons of HMA Class ½" PG 64-22 with 15% Rap and 3% RAS on Se 416th st at 2" compacted. Placed 25 T of same mix as prelevel on SE 416TH ST.
- All trucks came in with covered loads.
- Temp. Of mix was 270 deg at 89+66, 285deg at 83+50, 295deg at 75+50, 300 deg at 72+00. Temperature stayed within 5 deg. of 295deg. For rest of day.
- Talk to school principle at Elementary School. Discussed on school schedule and advised principle that we will adjust work hours. Contractor would start paving at 8am on Friday so that we are no way near school zone. Road will be closed from 212th to 236th but access will be given to school bus, parents and teachers.
- Call from Tara (lab) that 1st mix sample failed. # 200 was 7.2% and oil was 6.3. Advised f/man. Second sample failed also. #200 was at 6.8% and oil was 6.2. This could be the reason for easy compaction.
- Call from Kevin (lab) that King County and Wood worth have decided to pave the day 4 sections(st 36+50 to 10+17) on 09/24/09 using HMA plus 15% RAP. This would give Wood worth time to find out why mix sampled for today failed. Day 3 section (st 63+10 to 36+50) will now be paved on 09/25/09.
- Placed only 1" compacted mix on bridge crossing. It was rolled in static mode.
- WSDOT core crew on site with Joe (LAB) to core mix that was placed on Day 1(Mix had 15% RAP).

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____



**King County
HMA Test Results**

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/23/09 @ 7:35 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1224** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	91	90	to 100
3/8"	82	78	to 90
#4	58		to
#8	39	35	to 43
#16	27		to
#30	19		to
#50	14		to
#100	10		to
#200	7.2	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	1.1	2.5	to 5.5
% VMA @ Ndes	14.1	12.5	to N/A
% VFA @ Ndes	92.2	65	to 75
Dust/Asphalt Ratio	1.3	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.450		152.5 lb/ft³
Gmb (ASTM D2726)	2.423		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			6.4
% Water (WSDOT FOP for AASHTO T 329)	0.18		2.0 max

Mix Temperature in °F **329**
Oil Temperature in °F **330**
Air Temperature in °F **57**

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0	Gb (Binder)	1.028
Asphalt Content Design		5.6%		Mixing Temperature in °F	313
Anti Strip		0.00%		Compaction Temperature in °F	291
Pbe		4.5		Number of Gyrations @ Initial	8
Gsb (Aggregate Blend)		2.64		Number of Gyrations @ Design	100
Gsb (Fine Aggregate)		2.599		ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #10069T, ticket #245004. This truck was the 12th load of the day. The accumulative tonnage was 386.01. This is the first of two samples to be taken today. This mix contains 15% RAP and 3% RAS. Note: Yesterday, the tickets displayed MD090057, I questioned the Plant Operator about this and he stated that it was the same thing as MD090088, he agreed to change it on the tickets from now on. Ignition Furnace Calibration Factor Changed from 0.63 to 0.53.

This sample has failed to meet specifications for exceeding the tolerances for oil content% and the #200 screen.

Material meets
X fails to meet
above specifications.

Approved for
Distribution By: _____

Materials Engineer

Date

Tested and
Submitted by: _____

TEP

9/23/2009

Initial

Date

Copies Distribution
2 Resident Engr.
1 Const. Admin.
1 Dens. Engineer

Victor ylls
10/4/09



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/23/09 @ 7:35 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1224** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	8:46	10:40	11:10		
Tare Weight	512.0	512.0	512.0		
Sample + Tare Wt.	1176.6	1175.6	1175.4	Mass (Wt.) H ₂ O	1.2
Sample Weight	664.6	663.6	663.4	Percent H ₂ O	0.18

Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3010.1	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4867.9	Actual Asphalt Content in %:	6.4
Mass of Sample:	1857.8		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	7.32	Mass of Residual Agg. & Basket:	4734.2
Temperature Compensation (Ticket) in %:	0.16	Mass of Residual Agg. (Direct):	1724.1
Calibrated Asphalt Content (Ticket) in %:	6.63	Mass of Residual Agg. (Ticket):	1724.8

Difference of Masses of Residual Aggregate - Direct vs. Ticket = 0.0% Specification: shall be within $\pm 0.1\%$.

Sieve Analysis (AASHTO T30)	
Mass of Dry Washed Residual Aggregate:	1613.1

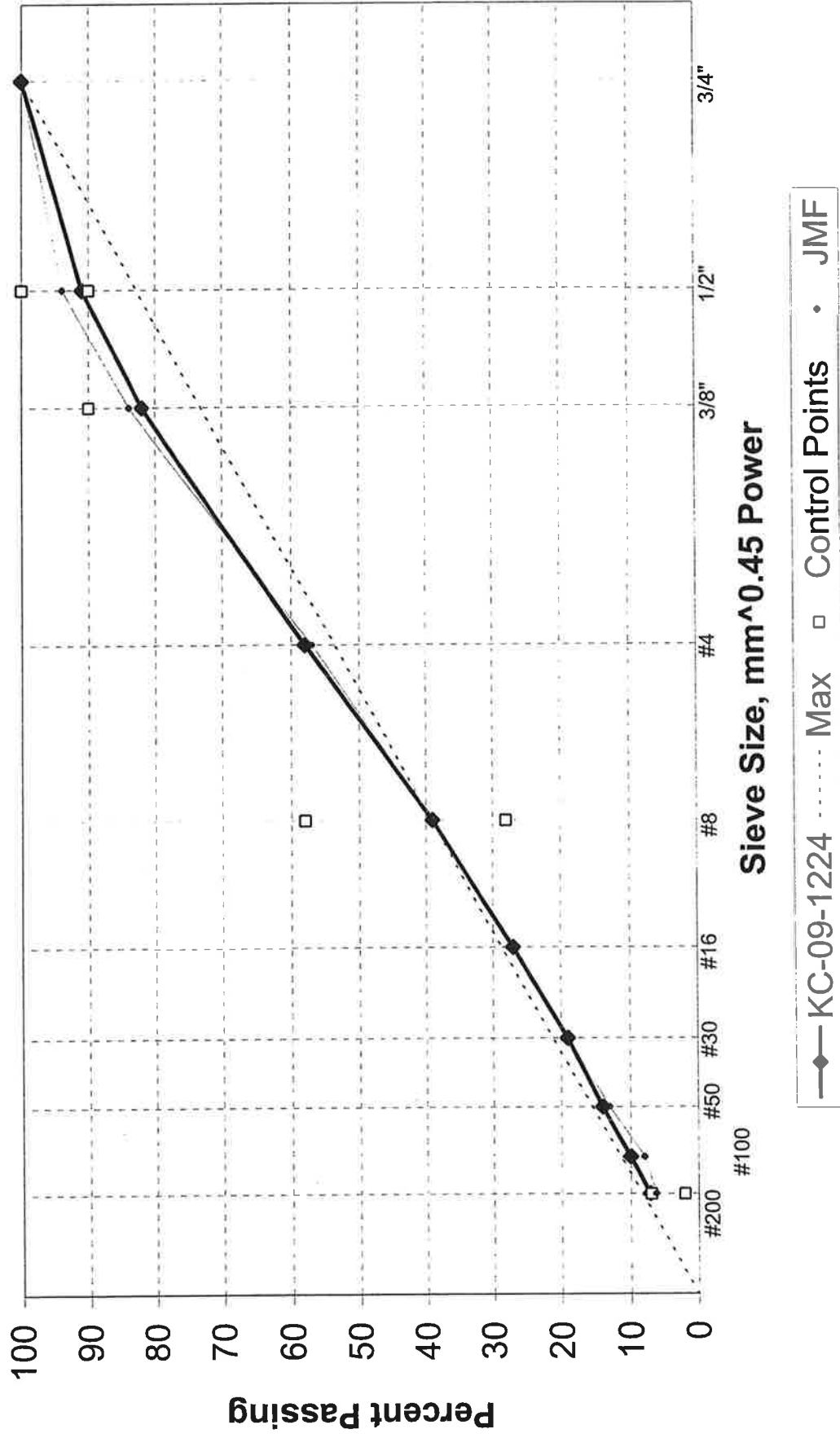
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	149.0	91	94	90	100	90	100
3/8"	302.4	82	84	78	90	0	90
#4	730.9	58	57				
#8	1050.9	39	39	35	43	28	58
#16	1259.0	27	27				
#30	1394.5	19	19				
#50	1487.9	14	13				
#100	1551.2	10	8				
#200	1600.1	7.2	6.3	4.3	7.0	2.0	7.0
Pan	1612.9						

Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$

Remarks: **Bold = Within Tolerance Limits** *Black Italic - At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #10069T, ticket #245004. This truck was the 12th load of the day. The accumulative tonnage was 386.01. This is the first of two samples to be taken today. This mix contains 15% RAP and 3% RAS. Note: Yesterday, the tickets displayed MD090057, I questioned the Plant Operator about this and he stated that it was the same thing as MD090088, he agreed to change it on the tickets from now on. Ignition Furnace Calibration Factor This sample has failed to meet specifications for exceeding the oil content and the #200 screen tolerances.

Material meets **X** fails to meet above specifications.

1/2 Inch HMA



KC-09-1224

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	329
Collection Date/Time	9/23/09 @ 7:35 AM	Oil Temp	330
Sample ID	KC-09-1224	Air Temp	57

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	<u>4800.0</u>			
Height in mm of Sample @ Initial Gyration	<u>124.9</u>	8	Compaction Temp. =	291
Height in mm of Sample @ Design Gyration	<u>113.3</u>	100		

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3010.1	Percent Loss (Ticket) in %:	7.32	
Mass of Basket & Sample	4867.9	Temp. Comp. (Ticket) in %:	0.16	Oil:
Sample Weight	1857.8	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4734.2	6.4

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	<u>512.0</u>	:	Min. test sample 500g.
Sample + Tare Wt.	<u>1176.6</u>	Time	<u>8:46</u>
Sample + Tare Wt.	<u>1175.6</u>	After 90 min.	<u>10:40</u>
Sample + Tare Wt.	<u>1175.4</u>	After 120 min.	<u>11:10</u>
			(Use Military Time, ex. 00:00)
			Moist %:
			0.18

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1528.6
Mass of Pycnometer Under Water @ 25.0 °C	1277.5
Pycnometer Calibration @ 77°F	
Mass of Sample & Pycnometer Under Water	2182.1
Temperature of Water 25.0 ± 1.0 °C	24.8

	Min. Mass
1/2"	1500g
3/4"	2000g
1"	2500g

RICE:
152.5

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample	1613.1
----------------------------	--------

1 1/2"	<u> </u>	#8	<u>1050.9</u>
1"	<u> </u>	#16	<u>1259.0</u>
3/4"	<u>0.0</u>	#30	<u>1394.5</u>
1/2"	<u>149.0</u>	#50	<u>1487.9</u>
3/8"	<u>302.4</u>	#100	<u>1551.2</u>
#4	<u>730.9</u>	#200	<u>1600.1</u>
Pan		1612.9	

Weight in Air	4771.5
Weight in Water	2804.0
Weight SSD	4773.2
Temp 25.0 ± 1.0 °C	25.0



HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1224** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			6.4
% Pass #200 Sieve			7.2
Gmm (Rice Specific Gravity)			2.450
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4800.0
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1528.6
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2182.1
(R) Temperature of Water in °C			24.8
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			1.00005
(V) Gmm @ 25°C = N*U/(N-(Q-O))			2.450
(W) Density @ 25°C = V*62.245 lb/ft ³			152.5
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4771.5
B = Mass in Grams of Surface-Dry Specimen in Air			4773.2
C = Mass in Grams of Specimen in Water			2804.0
Temperature of the Water °C			25.0
D = Temperature Correction for Density of Water			1.0000
Gmb = D A / (B-C)		(nearest 0.001)	2.423
Absorption = ((B-A) / (B-C))*100		(nearest 0.001)	0.086%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			124.9
H @ Ndes (Height of Sample @ Design Gyration)			113.3
% Gmm @ N ini = (Hdes*Gmb)/(Hini*Gmm)*100		(nearest 0.1)	89.7
% Gmm @ N des = (Gmb)/(Gmm)*100		(nearest 0.1)	98.9
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
Va = 100 *(1-(Gmb/Gmm))	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	1.1
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
VMA = 100 *(1-(Gmb*Ps/(Gsb*100)))	Mix Criteria = Min. 14.0%	(nearest 0.1)	14.1
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
VFA = 100 * [(VMA - Va) / VMA]	Mix Criteria = 65 to 75	(nearest 0.1)	92.2
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
Gse = (100 - Pb) / [(100 / Gmm) - (Pb / Gb)]		(nearest 0.001)	2.706
Pbe = -(Ps*Gb)*(Gse-Gsb)/(Gse*Gsb)+Pb		(nearest 0.1)	5.5
Ps = 100 - Pb		(nearest 0.1)	93.6
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.3



Mix Design Requirements and Specifications

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Mix ID: **MD090088** HMA Class: **1/2"**
Oil Source: **U.S. Oil** Resident Engineer: **Frank Overton**

Gradation							
Sieve Size	Contractor JMF		Tolerances		Control Points		
	% Passing		*LL	*UL	Class 1/2"		
					LL		UL
1 1/2"							
1"							
3/4"	100		99	100	100		100
1/2"	94		90	100	90		100
3/8"	84		78	90	0		90
#4	57		52	62			
#8	39		35	43	28		58
#16	27						
#30	19						
#50	13						
#100	8						
#200	6.3		4.3	7.0	2.0		7.0

Aggregate Source (Pit #)	B-333	B-160					
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to	<30		
% Asphalt Content Design	5.6		5.1%	to	6.1%		
% Anti Strip	0.00						
% Water						2% max	
% Va @ Ndes	C 3.7		2.5	to	5.5		
% VMA @Ndes	C 14.3		14	to	N/A		
% VFA @ Ndes	C 74		65	to	75		
Dust/Asphalt Ratio	C 1.4		0.6	to	1.6		
Pbe	C 4.5						
Gmm	S 2.463	SE Specification				45	
Gmb	S 2.374	Fracture	Single face			90%	
			Double face				
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity				44% min.	
Gsb (Fine Aggregate)	S 2.599						
Gb (Binder)	S 1.028						
Mixing Temperature in °F	313						
Max. Mixing Temperature in °F	350						
Compaction Temperature in °F	291						
Number of Gyrations @ Initial	8						
Number of Gyrations @ Design	100						
Number of Gyrations @ Max.	160						

Copies	Distribution
2	Resident Engr.
1	Const. Admin.

*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



**King County
HMA Test Results**

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/23/09 @ 10:50 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1227** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	91	90	to 100
3/8"	81	78	to 90
#4	56		to
#8	38	35	to 43
#16	27		to
#30	19		to
#50	13		to
#100	9		to
#200	6.8	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	0.9	2.5	to 5.5
% VMA @ Ndes	13.8	12.5	to N/A
% VFA @ Ndes	93.5	65	to 75
Dust/Asphalt Ratio	1.3	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.451		152.6 lb/ft³
Gmb (ASTM D2726)	2.428		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			6.3
% Water (WSDOT FOP for AASHTO T 329)	0.17		2.0 max

Mix Temperature in °F **315**
Oil Temperature in °F **330**
Air Temperature in °F **70**

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0	Gb (Binder)	1.028
Asphalt Content Design		5.6%		Mixing Temperature in °F	313
Anti Strip		0.00%		Compaction Temperature in °F	291
Pbe		4.5		Number of Gyrations @ Initial	8
Gsb (Aggregate Blend)		2.64		Number of Gyrations @ Design	100
Gsb (Fine Aggregate)		2.599		ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Maser Brown. A companion sample was taken by Woodworth. Sample was obtained from truck #81-181, ticket #245081. This truck was the 18th load of the day. The accumulative tonnage was 577.14. This is the second of two samples to be taken today. This mix contains 15% RAP and 3% RAS. This sample has failed to meet specifications for exceeding the tolerance for oil content %. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material meets
X fails to meet

above specifications.

Approved for
Distribution By: _____

Materials Engineer

Date

Tested and
Submitted by: _____

TEP 9/23/2009

Initial

Date

Copies Distribution
2 Resident Engr.
1 Const. Admin.
1 Dens. Engineer

Victor 3 usw
10/17/09



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/23/09 @ 10:50 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1227** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	11:41	1:11	1:53		
Tare Weight	513.5	513.5	513.5		
Sample + Tare Wt.	1471.1	1469.5	1469.5	Mass (Wt.) H ₂ O	1.6
Sample Weight	957.6	956.0	956.0	Percent H ₂ O	0.17

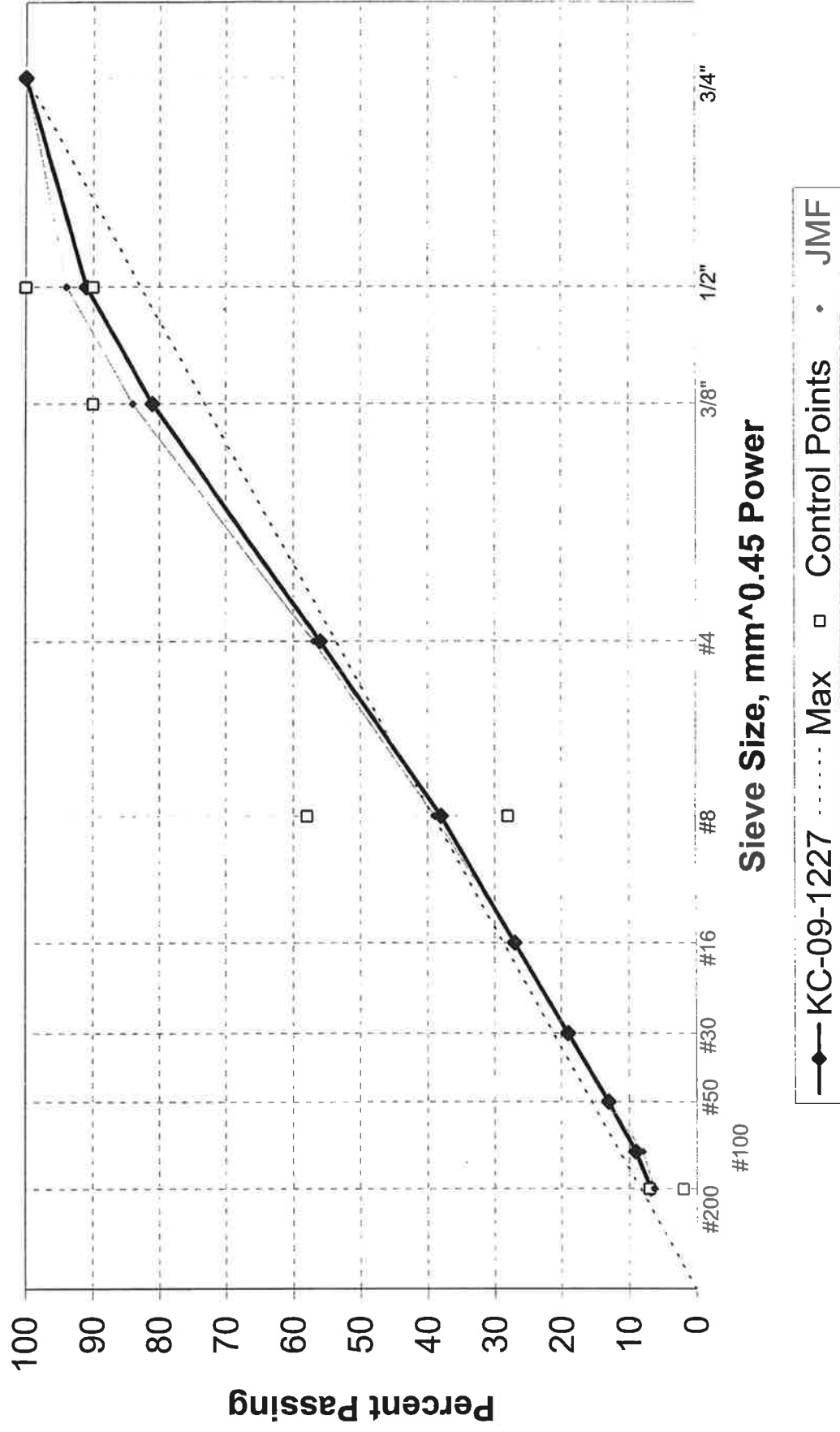
Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3010.4	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4704.9	Actual Asphalt Content in %:	6.3
Mass of Sample:	1694.5		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	7.15	Mass of Residual Agg. & Basket:	4585.9
Temperature Compensation (Ticket) in %:	0.18	Mass of Residual Agg. (Direct):	1575.5
Calibrated Asphalt Content (Ticket) in %:	6.44	Mass of Residual Agg. (Ticket):	1576.4
Difference of Masses of Residual Aggregate - Direct vs. Ticket = 0.1% Specification: shall be within $\pm 0.1\%$.			

Sieve Analysis (AASHTO T30)							
Mass of Dry Washed Residual Aggregate: 1475.7							
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	140.2	91	94	90	100	90	100
3/8"	291.8	81	84	78	90	0	90
#4	688.2	56	57				
#8	970.5	38	39	35	43	28	58
#16	1152.6	27	27				
#30	1276.6	19	19				
#50	1365.1	13	13				
#100	1425.9	9	8				
#200	1469.1	6.8	6.3	4.3	7.0	2.0	7.0
Pan	1475.6						
Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$							

Remarks: **Bold = Within Tolerance Limits** *Black Italic - At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Maser Brown. A companion sample was taken by Woodworth. Sample was obtained from truck #81-181, ticket #245081. This truck was the 18th load of the day. The accumulative tonnage was 577.14. This is the second of two samples to be taken today. This mix contains 15% RAP and 3% RAS. This sample has failed to meet specifications for exceeding the tolerance for oil content %. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material meets **X** fails to meet above specifications.

1/2 Inch HMA



KC-09-1227

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	315
Collection Date/Time	9/23/09 @ 10:50 AM	Oil Temp	330
Sample ID	KC-09-1227	Air Temp	70

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	4800.0		
Height in mm of Sample @ Initial Gyrations	124.9	8	Compaction Temp. = 291
Height in mm of Sample @ Design Gyrations	113.3	100	

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3010.4	Percent Loss (Ticket) in %:	7.15	
Mass of Basket & Sample	4704.9	Temp. Comp. (Ticket) in %:	0.18	Oil:
Sample Weight	1694.5	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4585.9	6.3

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	513.5		Min. test sample 500g.	
Sample + Tare Wt.	1471.1	Time	11:41	163 +/- 14° C for the oven temp.
Sample + Tare Wt.	1469.5	After 90 min.	1:11	Moist %:
Sample + Tare Wt.	1469.5	After 120 min.	1:53	(Use Military Time, ex. 00:00) 0.17

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1567.8			
Mass of Pycnometer Under Water @ 25.0 °C	1277.5			
Pycnometer Calibration @ 77°F				
Mass of Sample & Pycnometer Under Water	2205.6			
Temperature of Water 25.0 ± 1.0 °C	25.0			

	Min. Mass
1/2"	1500g
3/4"	2000g
1"	2500g

RICE:
152.6

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample	1475.7
----------------------------	--------

1 1/2"		#8	970.5
1"		#16	1152.6
3/4"	0.0	#30	1276.6
1/2"	140.2	#50	1365.1
3/8"	291.8	#100	1425.9
#4	688.2	#200	1469.1
Pan			1475.6

Weight in Air	4781.2
Weight in Water	2813.7
Weight SSD	4782.8
Temp 25.0 ± 1.0 °C	25.0



HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1227** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			6.3
% Pass #200 Sieve			6.8
Gmm (Rice Specific Gravity)			2.451
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4800.0
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1567.8
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2205.6
(R) Temperature of Water in °C			25.0
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			1.00000
(V) Gmm @ 25°C = $N \cdot U / (N - (Q - O))$			2.451
(W) Density @ 25°C = $V \cdot 62.245 \text{ lb/ft}^3$			152.6
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4781.2
B = Mass in Grams of Surface-Dry Specimen in Air			4782.8
C = Mass in Grams of Specimen in Water			2813.7
Temperature of the Water °C			25.0
D = Temperature Correction for Density of Water			1.0000
Gmb = $D \cdot A / (B - C)$		(nearest 0.001)	2.428
Absorption = $((B - A) / (B - C)) \cdot 100$		(nearest 0.001)	0.081%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			124.9
H @ Ndes (Height of Sample @ Design Gyration)			113.3
% Gmm @ N ini = $(H_{des} \cdot G_{mb}) / (H_{ini} \cdot G_{mm}) \cdot 100$		(nearest 0.1)	89.9
% Gmm @ N des = $(G_{mb}) / (G_{mm}) \cdot 100$		(nearest 0.1)	99.1
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
Va = $100 \cdot (1 - (G_{mb} / G_{mm}))$	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	0.9
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
VMA = $100 \cdot (1 - (G_{mb} \cdot P_s / (G_{sb} \cdot 100)))$	Mix Criteria = Min. 14.0%	(nearest 0.1)	13.8
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
VFA = $100 \cdot [(VMA - Va) / VMA]$	Mix Criteria = 65 to 75	(nearest 0.1)	93.5
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
Gse = $(100 - Pb) / [(100 / G_{mm}) - (Pb / G_b)]$		(nearest 0.001)	2.703
Pbe = $-(P_s \cdot G_b) \cdot (G_{se} - G_{sb}) / (G_{se} \cdot G_{sb}) + Pb$		(nearest 0.1)	5.4
P _s = 100 - Pb		(nearest 0.1)	93.7
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.3



Mix Design Requirements and Specifications

Project: SE 416th St Overlay, Shingles in Paving Demo.	Project Number: M78030
Contractor: Woodworth & Co.	Contract Number: C004555C09
Asphalt Supplier: Woodworth Lakesview	Mix ID: MD090088 HMA Class: 1/2"
Oil Source: U.S. Oil	Resident Engineer: Frank Overton

Gradation							
Sieve Size	Contractor JMF		Tolerances		Control Points		
	% Passing		*LL	*UL	Class 1/2"		
					LL		UL
1 1/2"							
1"							
3/4"	100		99	100	100		100
1/2"	94		90	100	90		100
3/8"	84		78	90	0		90
#4	57		52	62			
#8	39		35	43	28		58
#16	27						
#30	19						
#50	13						
#100	8						
#200	6.3		4.3	7.0	2.0		7.0

Aggregate Source (Pit #)	B-333	B-160				
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to	<30	
% Asphalt Content Design	5.6		5.1%	to	6.1%	
% Anti Strip	0.00					
% Water					2% max	
% Va @ Ndes	C 3.7		2.5	to	5.5	
% VMA @Ndes	C 14.3		14	to	N/A	
% VFA @ Ndes	C 74		65	to	75	
Dust/Asphalt Ratio	C 1.4		0.6	to	1.6	
Pbe	C 4.5					
Gmm	S 2.463	SE Specification			45	
Gmb	S 2.374	Fracture	Single face		90%	
			Double face			
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity			44% min.	
Gsb (Fine Aggregate)	S 2.599					
Gb (Binder)	S 1.028					
Mixing Temperature in °F	313					
Max. Mixing Temperature in °F	350					
Compaction Temperature in °F	291					
Number of Gyrations @ Initial	8					
Number of Gyrations @ Design	100					
Number of Gyrations @ Max.	160					

Copies	Distribution
2	Resident Engr.
1	Const. Admin.

*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



HMA Mineral Aggregate Results

Project: **SE 416th St Overlay** Project Number: **M78030**
Contractor: **Woodworth** Contract Number: **C00455C09**
Name of Source: **Miles Sand and Gravel Roy Pit** Sampling Location: **Plant/Belt**
Lab Sample Number: **KC-09-1225** Collection Date: **9/23/2009 @ Afternoon**
Mix ID: **MD090088** Pit #: **B-333** Sampled By: **TEP** HMA Class: **1/2"**

Sand Equivalent Test (AASHTO T-176)

SE Value = $\frac{\text{Sand Reading (100)}}{\text{Clay Reading}}$

Clay Reading	Sand Reading	SE Value
6.4	3.5	55
Specification =		45 Min.

Percentage of Fracture in Course Aggregate (AASHTO TP-61)

P = Percent of fracture

Q = Mass of questionable particles or borderline particles

F = Mass of fractured particles

N = Mass of unfractured particles

$$P = \left[\frac{F + \left(\frac{Q}{2} \right)}{F + Q + N} \right] * 100$$

Sieve Size	F	Q	N	P
1"				
3/4"				
1/2"	652.2	0.0	0.0	100
3/8"	497.8	0.0	4.3	99
#4	312.7	0.0	1.7	99

Specification = Single Face = 90 % Double Face =

Uncompacted Void Content of Fine Aggregate (AASHTO T-304)

V = Volume of cylindrical measure, ml

G = Bulk dry specific gravity fine agg. (G_b)

F = Net mass, g, of fine aggregate in measure

U = Uncompacted voids, percent, in the material

Preparation of Test Sample	
Sieve Size	Mass
#8 - #16	44 +/- 0.2 g
#16 - #30	57 +/- 0.2 g
#30 - #50	72 +/- 0.2 g
#50 - #100	17 +/- 0.2 g
Specification	44 Min.

Tare 185.64

$$U = \left[\frac{V - \left(\frac{F}{G} \right)}{V} \right] * 100$$

V	F	G	U
100.0	141.89	2.599	45.4
100.0	141.24	2.599	45.7
Average			46

Remarks:

Material X meets
above specifications.
 fails to meet

Copies Distribution
 2 Resident Engr.
 1 Const. Admin.

Approved for
Distribution By:

Tested and
Submitted by:

CW 9/28/2009

Materials Engineer

Date

Initial

Date



HMA Mineral Aggregate Results

Project: **SE 416th St Overlay** Project Number: **M78030**
Contractor: **Woodworth** Contract Number: **C00455C09**
Name of Source: **Miles Sand and Gravel Roy Pit** Sampling Location: **Plant/Belt**
Lab Sample Number: **KC-09-1228** Collection Date: **9/23/2009 @ Afternoon**
Mix ID: **MD090088** Pit #: **B-333** Sampled By: **TEP** HMA Class: **1/2"**

Sand Equivalent Test (AASHTO T-176)

SE Value = $\frac{\text{Sand Reading (100)}}{\text{Clay Reading}}$

Clay Reading	Sand Reading	SE Value
6	3.3	55
Specification =		45 Min.

Percentage of Fracture in Course Aggregate (AASHTO TP-61)

P = Percent of fracture

Q = Mass of questionable particles or borderline particles

F = Mass of fractured particles

N = Mass of unfractured particles

$$P = \left[\frac{F + \left(\frac{Q}{2} \right)}{F + Q + N} \right] * 100$$

Sieve Size	F	Q	N	P
1"				
3/4"				
1/2"	20.2	0.0	0.0	100
3/8"	727.8	0.0	27.8	96
#4	374.5	0.0	0.7	100

Specification = Single Face = 90 % Double Face =

Uncompacted Void Content of Fine Aggregate (AASHTO T-304)

V = Volume of cylindrical measure, ml

G = Bulk dry specific gravity fine agg. (G_b)

F = Net mass, g, of fine aggregate in measure

U = Uncompacted voids, percent, in the material

Preparation of Test Sample

Sieve Size	Mass
#8 - #16	44 +/- 0.2 g
#16 - #30	57 +/- 0.2 g
#30 - #50	72 +/- 0.2 g
#50 - #100	17 +/- 0.2 g
Specification	44 Min.

Tare 185.64

$$U = \left[\frac{V - \left(\frac{F}{G} \right)}{V} \right] * 100$$

V	F	G	U
100.0	138.4	2.599	46.7
100.0	137.88	2.599	46.9
Average			47

Remarks:

Material X meets
above specifications.
_____ fails to meet

Copies Distribution
2 Resident Engr.
1 Const. Admin.

Approved for
Distribution By:

Tested and
Submitted by:

CW 9/28/2009

Materials Engineer

Date

Initial

Date



King County

Hot Mix Asphalt Compaction Form

Date	9/23/09	Project	416th RAS Study				No.	Section	Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview
Class	1/2"	Lift	Wearing	Start Air Temp.	50	End Air Temp.	84	Gauge	Troxler 4640B #2659					
Estimated Density (p) =		0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons		Lot Length to nearest 100' (A) = $V(ft^3) / W(ft) \times D(ft)$ =			
Beg. Sta.	+	Sublot Ln. [(A) x 0.2] = (L)		238ft		Sta. to Sta.	Loc.		Enumclaw		ACP Test Temp.			
Test	Location Code	Test Location				Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #3	89+20				9.5' RT	0.17	148.8	147.6	148.2	1.008	149.4	152.4	98.0
2	Section #3	87+50				6' RT	0.17	146.8	148.8	147.8	1.008	149.0	152.4	97.8
3	Section #3	85+06				2' RT	0.17	148.6	146.6	147.6	1.008	148.8	152.4	97.6
4	Section #3	82+90				10' RT	0.17	146.8	148.1	147.5	1.008	148.6	152.4	97.5
5	Section #3	80+80				7' RT	0.17	146.8	148.3	147.6	1.008	148.7	152.4	97.6
Lot Avg.														97.7
Estimated Density (p) =		0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons	Vol. of ACP in Sublot (V) = = $V(ft^3) / W(ft) \times D(ft)$ =		2635.0 ft ³		1190ft
Beg. Sta.	+	Sublot Ln. [(A) x 0.2] = (L)		238ft		Sta. to Sta.	Loc.		Enumclaw		ACP Test Temp.		Lot #	% of Rice
Test	Location Code	Test Location				Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #3	77+50				3' RT	0.17	147.6	146.7	147.2	1.008	148.3	152.4	97.3
2	Section #3	74+85				5' RT	0.17	145.4	144.8	145.1	1.008	146.3	152.4	96.0
3	Section #3	71+75				8.5' RT	0.17	148.5	147.4	148.0	1.008	149.1	152.4	97.9
4	Section #3	69+45				4' RT	0.17	143.0	143.4	143.2	1.008	144.3	152.4	94.7
5	Section #3	67+20				2.5' RT	0.17	142.5	142.7	142.6	1.008	143.7	152.4	94.3
Lot Avg.														96.0

Field tests performed using KCDOT Test Method N-1.

Pavers:	Blaw Knox PF-5510 #711
Remarks:	Woodworth paved test section #3 on the plan sheet. They planned to do 1000 tons. The asphalt placed today had 15% RAP and 3% RAS.
Rollers	Breakdown Sakal GW 750 P
Passes	4 Vibe 2-3 Static
Intermediate IR 110 HF DDV	

Roller Codes: SDV - Single Drum Vibrator P-Pneumatic
DDV Double Drum Vibrator TS - Tandem Steel

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009



King County Hot Mix Asphalt Compaction Form

Date	9/23/09	Project	416th RAS Study				No.	Section	Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview										
Class	1/2"	Lift	Start Air Temp.	48	End Air Temp.	84	Gauge	Troxler 4640B #2659		Mix I.D.	MD090088		Rand. #											
Estimated Density (p) =		0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons	2635.0 ft ³		Lot Length to nearest 100' (A) = V(ft ³) / W(ft) x D(ft) =		1190ft										
Beg. Sta.	+	Sublot Ln. [(A) x 0.2] = (L)	238ft	Sta. to Sta.			Loc.	Enumclaw	ACP Test Temp.		Lot #		8											
Test	Location Code	Test Location		Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice												
1	Section #3	65+00		10' RT	0.17	145.5	143.8	144.7	1.008	145.8	152.4	95.7												
2	Section #3	63+75		5.5' RT	0.17	144.4	143.3	143.9	1.008	145.0	152.4	95.1												
3	Section #3	89+00		7.5' LT	0.17	145.2	146.6	145.9	1.008	147.1	152.4	96.5												
4	Section #3	87+15		3.5' LT	0.17	148.9	147.7	148.3	1.008	149.5	152.4	98.1												
5	Section #3	84+80		10' LT	0.17	148.3	147.8	148.1	1.008	149.2	152.4	97.9												
Estimated Density (p) =												0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons	Vol. of ACP in Sublot (V) =	Lot Length to nearest 100' (A) = V(ft ³) / W(ft) x D(ft) =		1190ft	
Beg. Sta.	+	Sublot Ln. [(A) x 0.2] = (L)	238ft	Sta. to Sta.			Loc.	Enumclaw	ACP Test Temp.		Lot #		9											
Test	Location Code	Test Location		Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice												
1	Section #3	82+53		2.5' LT	0.17	144.9	143.5	144.2	1.008	145.4	152.4	95.4												
2	Section #3	80+25		4.5' LT	0.17	148.2	147.3	147.8	1.008	148.9	152.4	97.7												
3	Section #3	77+65		8.5' LT	0.17	141.9	143.4	142.7	1.008	143.8	152.4	94.4												
4	Section #3	75+50		9.5' LT	0.17	141.4	143.6	142.5	1.008	143.6	152.4	94.3												
5	Section #3	73+10		6.5' LT	0.17	143.4	145.3	144.4	1.008	145.5	152.4	95.5												
Field tests performed using KCDOT Test Method N-1.												Lot Avg.		95.4										

Pavers:	Blaw Knox PF-5510 #711
Remarks:	Woodworth paved test section #3 on the plan sheet they plan to pave 1000 tons. The asphalt placed today had 15% RAP and 3% RAS.
Rollers	Breakdown Sakal GW 750 P
Intermediate	IR 110 HF DDV
Passes	4 Vibe 2-3 Static
Roller Codes: SDV - Single Drum Vibrator P-Pneumatic DDV Double Drum Vibrator TS - Tandem Steel	

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009



King County Hot Mix Asphalt Compaction Form

155 Monroe Avenue NE, Bldg. D,
Renton, WA 98056-4199
Phone: (206) 296-7709
Fax: (206) 296-0179

Date	9/24/09	Project	416th RAS Study				No.	Section		Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview	
Class	1 1/2" Lift	Start Air Temp.	48	End Air Temp.	84		Gauge	Troxler 4640B #2659		Mix I.D.	MD090088		Plant	Plant	Plant	
Estimated Density (p) =	0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons		2635.0 ft ³		Lot Length to nearest 100' (A) =		1190ft		
Beg. Sta.	+	Sublot Ln. [(A) x 0.2] = (L)		238ft	Sta. to Sta.	Loc.		Enumclaw		ACP Test Temp.		Lot #		10		
Test	Location Code	Test Location		Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice				
1	Section #3	70+90		4' LT	0.17	145.8	144.1	145.0	1.008	146.1	152.4	95.9				
2	Section #3	68+00		9' LT	0.17	145.9	145.1	145.5	1.008	146.7	152.4	96.2				
3	Section #3	66+25		5' LT	0.17	146.2	145.1	145.7	1.008	146.8	152.4	96.3				
4	Section #3	64+00		2.5' LT	0.17	144.4	145.1	144.8	1.008	145.9	152.4	95.7				
5	Section #3	63+42		10.5' Lt	0.17	147.4	148.6	148.0	1.008	149.2	152.4	97.9				
											Lot Avg.		96.4			

Estimated Density (p) =	0.0759 Tons/ft ³	Width (W) =	Depth (D) =	238ft	Sta. to Sta.	Sublot Size (S)	Vol. of ACP in Sublot (V) =		Lot Length to nearest 100' (A) =					
Beg. Sta.	+	Sublot Ln. [(A) x 0.2] = (L)		238ft	Sta. to Sta.	Loc.	ACP Test Temp.		Lot #					
Test	Location Code	Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice				
1														
2														
3														
4														
5														
											Lot Avg.			

Field tests performed using KCDOT Test Method N-1.

Pavers:	Blaw Knox PF-5510 #711
Remarks:	Woodworth paved test section #3 on the plan sheet they plan to pave 1000 tons. The asphalt placed today had 15% RAP and 3% RAS.
Rollers	Breakdown Sakai GW 750 P
Intermediate	IR 110 HF DDV
Passes	4 Vibe 2-3 Static

Roller Codes: SDV - Single Drum Vibrator P-Pneumatic
DDV Double Drum Vibrator TS - Tandem Steel

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009

**SE 416th Street Overlay:
Shingles in Paving Demonstration**

Construction Inspection and Quality Control Testing

Paving Day 3 (9-24-09)

**Inspectors Daily Report
HMA Test Results
HMA Mineral Aggregate Test Results
HMA Compaction Test Results**

KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 1 of 2

DATE: **Thursday September 24th 2009**

Federal Aid #

PROJECT NO. **M78030**

CONTRACT NO. **C00455C09**

PROJECT:

**SE 416th ST Overlay- Shingles in Paving
Demonstration**

INSPECTOR (S): **S.Shandil, M.Pavolka**

CONTRACTOR: **Woodworth & Company**

WEATHER: **Overcast**

TEMP: High **60** Low **65**

WIND: Still ☒ Moderate ☒ High

Workable **8** Nonworkable **0**

SIGNS AND TRAFFIC CONTROL CHECKED? Yes ☒ No

ON-SITE INTERVIEW? Yes No ☒

WORK DONE:

- **Woodworth (Paving):** 7am Set up traffic control signs and flaggers on SE 416th st. Road closed between 236th and 212th ave. 7.30 Crew Remove paper joint at 212th ave. Place tack from 36+50 to 10+17 at 212th ave. Mob. Equipment. 8am begin paving. Place paper joint at st # 36+50. North side from st # 36+50 to 10+17. Luke operating shuttle buggy to transfer mix on to paver. Al operating Blaw Knox paver with Jonathan as screed operator. Shane using Sakai as b/down roller with Willie operating DD-110HF as intermediate/finish roller and the DD-28HF for side streets d/ways. 10.50 End paving at st# 10+17. Waited for 1hr, place water to drop mat temp. on North side. 12 noon begin paving South side from st # 10+17 to 36+50. End paving at 2.30 pm, had about 10tons mix in shuttle buggy. Pre level South side of road to cover county prep. Work. End at 2.45pm. Continued with compaction. Placed temp tapes, place water to drop mat temp. Road opened at 3.30pm. Flaggers continued to relocate detour signs for paving on 09/25/09. Done at 4.30pm.
- **Gloria Jeanne: (Grinding):** Complete on 09/21/09.

EQUIPMENT ON PROJECT:

- **Woodworth:** 1- F/M work truck (Chevy 2500HD), 1- Work truck (F 450 + Trailer # 38) 1 – Flagging truck(Chevy 2500 HD # 1264 and 1262), 1 Back Hoe(JD 510 # 203), 1- Shuttle Buggy (SB- 2500B # 715), 1- Paver(Blaw Knox # 711), 3 Rollers(I.R DD-28HF # 841, I.R DD-110HF # 810, Sakai GW 750 # 822 Pneumatic Roller), Ken worth Water Truck # 26, Peter Bilt Tack Truck # 9
- **Gloria Jeanne:**
- **PERSONNEL ON PROJECT:**
- **Woodworth:** 1- Project Manager(Scott Droppelman), 1- F/M (Dan Andreas), 1- Paver operators(Al Anderson), 1- Shuttle buggy operator (Luke Dillard), 1 – Screed operator (Jonathan Pullack), 2 – Roller operators (Shane Thomas, Willie Guillen), 2- Truck spotter (Dave Thorton, Penny Cochran), 1 – Raker (Ludvig Yefimov), 1 – Tack Operator (Luke Edwards), 1- TCS (Tara), 4- Flaggers(Glen, Katy, Ray and Paula), 1- Q.C (Renee Walton from CTL)
- **Gloria Jeanne:**
- **King County:** Joe(Lab), Jim Eagan, Kris Beatty (DNR).
- **Others:** Warren (Enumclaw water district), Herb(WSDOT)

REMARKS:

- Road closed between 236Th ave and 212th ave. Flaggers at each major crossing to stop cars entering in to work zone from 7am to 5pm.
- Used Sakai as break down roller on 6 vibes, DD-110 as intermediate roller on 4 vibes, 2 static rolling pattern and DD-28 for Side Street / driveways.
- Temperature of laid down mix ranged from 270 deg. To 300deg. Outside air temp. Was in the mid 80deg.

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____

**KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 2 of 2**

DATE: **Thursday September 24th 2009**

- Day 3 Paving was from station 36+50 to 10+17. See I.D.R on 09/23/09 for skipping section. Section in between 63+10 to 36+50 will be paved on 09/25/09. Wood Worth haul mix from Lake View plant using 15 truck and trailers. Placed 894.36 Tons of HMA Class ½" PG 64-22 with 15% Rap on Se 416th st at 2" compacted. Placed 10 T of same mix as prelevel on SE 416TH ST.
- All trucks came in with covered loads.
- Prelevel section was on the South side from st # 36+75 to 43+00 (0" at centre to ½" at edge)
- Mat on South side had tear at st# 20+00. Contractor fixed with Sakai.
- Temp. Of mix on North side was 290 deg at 36+50, 285deg at 12+50. Begin temp. on South side was 272deg at 10+17, 285 deg at 11+50, 300deg at 13+50. Temperature stayed within 5 deg. of 295deg. for rest of day. Temp. at st # 10+17 on the South side was a bit low because of mix sitting in the hopper.
- Talk to school principle at Elementary School. Advised her of change in plans of paving near school today instead of Friday. She was fine.
- Call from Tara (lab) that 1st mix sample passed.
- WSDOT core crew on site with Joe (LAB) to core mix that was placed on Day 2(mix had 3% RAS).
- Compaction was hard to achieve on the South side for last 1500.'

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____



King County HMA Test Results

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/24/09 @ 7:09 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1261** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	92	90	to 100
3/8"	83	78	to 90
#4	57		to
#8	38	35	to 43
#16	26		to
#30	18		to
#50	13		to
#100	9		to
#200	6.5	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	2.2	2.5	to 5.5
% VMA @ Ndes	13.3	12.5	to N/A
% VFA @ Ndes	83.5	65	to 75
Dust/Asphalt Ratio	1.4	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.481		154.4 lb/ft³
Gmb (ASTM D2726)	2.426		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			5.7
% Water (WSDOT FOP for AASHTO T 329)	0.12		2.0 max

Mix Temperature in °F **338**
Oil Temperature in °F **330**
Air Temperature in °F **54**

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0
Asphalt Content Design		5.6%	
Anti Strip		0.00%	
Pbe		4.5	
Gsb (Aggregate Blend)		2.64	
Gsb (Fine Aggregate)		2.599	

Gb (Binder)	1.028
Mixing Temperature in °F	313
Compaction Temperature in °F	291
Number of Gyration @ Initial	8
Number of Gyration @ Design	100
ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #87-157, ticket #245183. This truck was the 3rd load of the day. The accumulative tonnage was 96.23. This is the first of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

X meets
Material _____
_____ fails to meet

above specifications.

Approved for
Distribution By:

Materials Engineer

Date

Tested and
Submitted by:

TEP 9/24/2009

Initial Date

Victor Z. Wood
10/9/09

Copies Distribution
2 Resident Engr.
1 Const. Admin.
1 Dens. Engineer



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/24/09 @ 7:09 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1261** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	8:49	10:29	10:49		
Tare Weight	513.8	513.8	513.8		
Sample + Tare Wt.	1243.2	1242.4	1242.3	Mass (Wt.) H ₂ O	0.9
Sample Weight	729.4	728.6	728.5	Percent H ₂ O	0.12

Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3010.4	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4855.6	Actual Asphalt Content in %:	5.7
Mass of Sample:	1845.2		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	6.56	Mass of Residual Agg. & Basket:	4737.3
Temperature Compensation (Ticket) in %:	0.16	Mass of Residual Agg. (Direct):	1726.9
Calibrated Asphalt Content (Ticket) in %:	5.87	Mass of Residual Agg. (Ticket):	1727.1

Difference of Masses of Residual Aggregate - Direct vs. Ticket = 0.0% Specification: shall be within $\pm 0.1\%$.

Sieve Analysis (AASHTO T30)	
Mass of Dry Washed Residual Aggregate:	1624.9

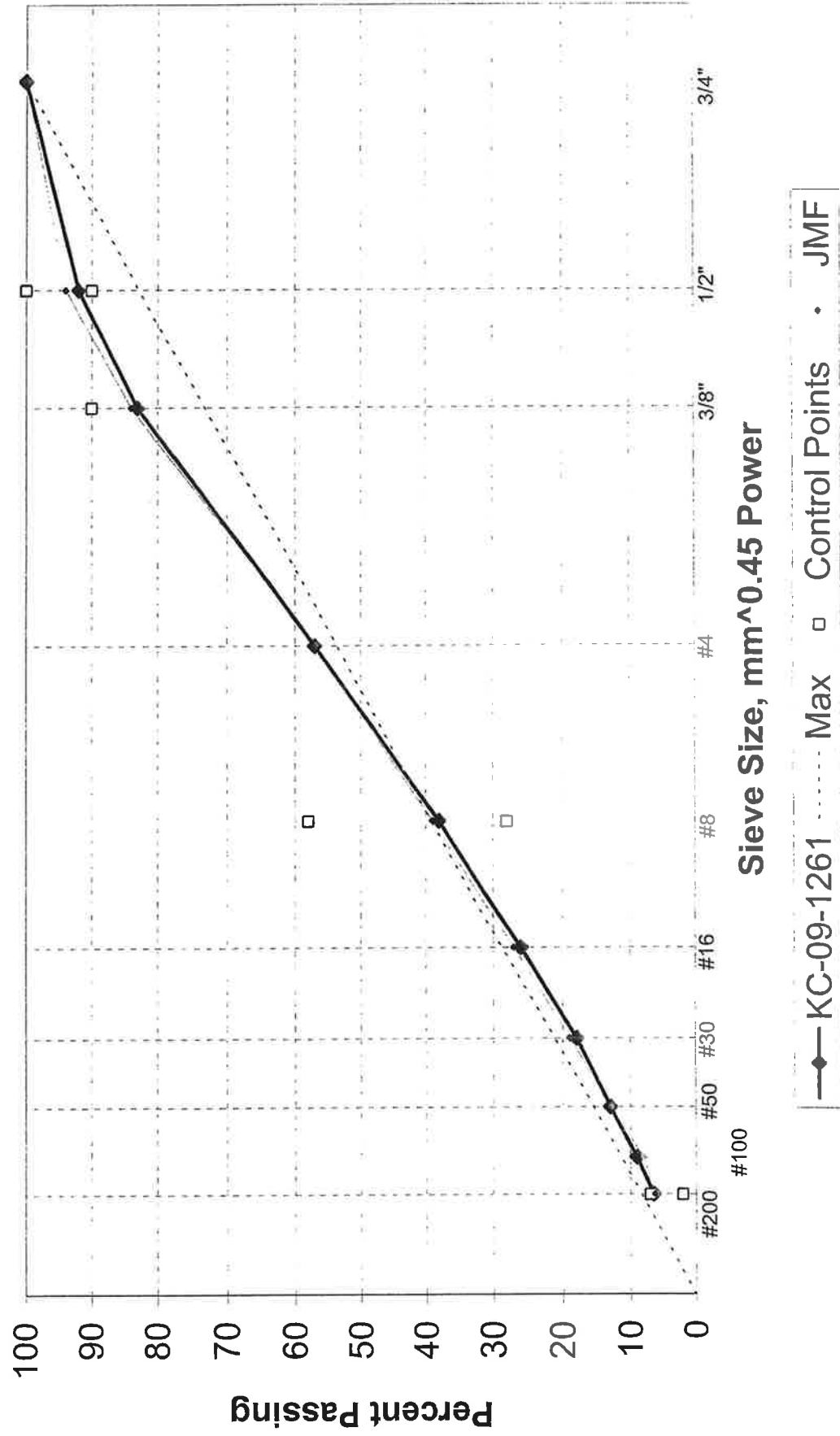
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	133.1	92	94	90	100	90	100
3/8"	288.5	83	84	78	90	0	90
#4	736.8	57	57				
#8	1069.4	38	39	35	43	28	58
#16	1274.3	26	27				
#30	1407.7	18	19				
#50	1503.2	13	13				
#100	1567.3	9	8				
#200	1614.0	6.5	6.3	4.3	7.0	2.0	7.0
Pan	1624.7						

Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$

Remarks: **Bold = Within Tolerance Limits** *Black Italic = At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #87-157, ticket #245183. This truck was the 3rd load of the day. The accumulative tonnage was 96.23. This is the first of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material **X** meets _____ fails to meet _____ above specifications.

1/2 Inch HMA



KC-09-1261

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	338
Collection Date/Time	9/24/09 @ 7:09 AM	Oil Temp	330
Sample ID	KC-09-1261	Air Temp	54

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	4800.0		
Height in mm of Sample @ Initial Gyrations	126.2	8	Compaction Temp. = 291
Height in mm of Sample @ Design Gyrations	114	100	

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3010.4	Percent Loss (Ticket) in %:	6.56	
Mass of Basket & Sample	4855.6	Temp. Comp. (Ticket) in %:	0.16	Oil:
Sample Weight	1845.2	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4737.3	5.7

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	513.8	:	Min. test sample 500g.
Sample + Tare Wt.	1243.2	Time 8:49	163 +/- 14° C for the oven temp.
Sample + Tare Wt.	1242.4	After 90 min. 10:29	Moist %:
Sample + Tare Wt.	1242.3	After 120 min. 10:49 (Use Military Time, ex. 00:00)	0.12

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1520.0
Mass of Pycnometer Under Water @ 25.0 °C	1277.5
Pycnometer Calibration @ 77°F	
Mass of Sample & Pycnometer Under Water	2184.8
Temperature of Water 25.0 ± 1.0 °C	25.2

	Min. Mass
1/2"	1500g
3/4"	2000g
1"	2500g

RICE:
154.4

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample	1624.9
----------------------------	--------

1 1/2"	#8	1069.4
1"	#16	1274.3
3/4"	0.0	#30 1407.7
1/2"	133.1	#50 1503.2
3/8"	288.5	#100 1567.3
#4	736.8	#200 1614.0
Pan		1624.7

Weight in Air	4788
Weight in Water	2818.7
Weight SSD	4792.6
Temp 25.0 ± 1.0 °C	25.0



HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1261** HMA Class: **1/2"**

Required Data	
Percent Binder (Pb)	5.7
% Pass #200 Sieve	6.5
Gmm (Rice Specific Gravity)	2.481
Compaction Temperature in °F	291
Initial Weight of Uncompacted Mixture	4800.0
Number of Gyration @ Initial	8
Number of Gyration @ Design	100
Gb (Specific Gravity of the Binder)	1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)	2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)	
(N) Sample Mass	1520
(O) Mass of Pycnometer Under Water	1277.5
(P) Pycnometer Calibration @ 77°F	
(Q) Mass of Sample & Pycnometer Under Water	2184.8
(R) Temperature of Water in °C	25.2
(S) Pycnometer Calibration @ Test Temperature	
(T) Bitumen Thermal Correction	
(U) Water Thermal Correction	0.99995
(V) Gmm @ 25°C = $N \cdot U / (N - (Q - O))$	2.481
(W) Density @ 25°C = $V \cdot 62.245 \text{ lb/ft}^3$	154.4
Bulk Specific Gravity "Gmb" (ASTM D2726)	
A = Mass in Grams of Specimen in Air	4788
B = Mass in Grams of Surface-Dry Specimen in Air	4792.6
C = Mass in Grams of Specimen in Water	2818.7
Temperature of the Water °C	25.0
D = Temperature Correction for Density of Water	1.0000
Gmb = $D \cdot A / (B - C)$	(nearest 0.001) 2.426
Absorption = $((B - A) / (B - C)) \cdot 100$	(nearest 0.001) 0.233%
Gyratory Compactor Data (AASHTO T 312)	
H @ Nini (Height of Sample @ Initial Gyration)	126.2
H @ Ndes (Height of Sample @ Design Gyration)	114
% Gmm @ Nini = $(H_{des} \cdot G_{mb}) / (H_{ini} \cdot G_{mm}) \cdot 100$	(nearest 0.1) 88.3
% Gmm @ Ndes = $(G_{mb}) / (G_{mm}) \cdot 100$	(nearest 0.1) 97.8
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}	
Va = $100 \cdot (1 - (G_{mb} / G_{mm}))$	JMF Tolerance = 2.5% to 5.5% (nearest 0.1) 2.2
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}	
VMA = $100 \cdot (1 - (G_{mb} \cdot P_s / (G_{sb} \cdot 100)))$	Mix Criteria = Min. 14.0% (nearest 0.1) 13.3
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}	
VFA = $100 \cdot [(VMA - Va) / VMA]$	Mix Criteria = 65 to 75 (nearest 0.1) 83.5
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}	
Gse = $(100 - Pb) / [(100 / G_{mm}) - (Pb / G_b)]$	(nearest 0.001) 2.713
Pbe = $-(P_s \cdot G_b) \cdot (G_{se} - G_{sb}) / (G_{se} \cdot G_{sb}) + Pb$	(nearest 0.1) 4.7
P _s = 100 - Pb	(nearest 0.1) 94.3
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6 (nearest 0.1) 1.4



Mix Design Requirements and Specifications

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Mix ID: **MD090088** HMA Class: **1/2"**
Oil Source: **U.S. Oil** Resident Engineer: **Frank Overton**

Gradation

Sieve Size	Contractor JMF % Passing	Tolerances		Control Points Class 1/2"	
		*LL	*UL	LL	UL
1 1/2"					
1"					
3/4"	100	99	100	100	100
1/2"	94	90	100	90	100
3/8"	84	78	90	0	90
#4	57	52	62		
#8	39	35	43	28	58
#16	27				
#30	19				
#50	13				
#100	8				
#200	6.3	4.3	7.0	2.0	7.0

Aggregate Source (Pit #)	B-333	B-160			
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to	<30
% Asphalt Content Design	5.6		5.1%	to	6.1%
% Anti Strip	0.00				
% Water					2% max
% Va @ Ndes	C 3.7		2.5	to	5.5
% VMA @Ndes	C 14.3		14	to	N/A
% VFA @ Ndes	C 74		65	to	75
Dust/Asphalt Ratio	C 1.4		0.6	to	1.6
Pbe	C 4.5				
Gmm	S 2.463	SE Specification			45
Gmb	S 2.374	Fracture	Single face		90%
			Double face		
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity			44% min.
Gsb (Fine Aggregate)	S 2.599				
Gb (Binder)	S 1.028				
Mixing Temperature in °F	313				
Max. Mixing Temperature in °F	350				
Compaction Temperature in °F	291				
Number of Gyrations @ Initial	8				
Number of Gyrations @ Design	100				
Number of Gyrations @ Max.	160				

Copies	Distribution
2	Resident Engr.
1	Const. Admin.

*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



**King County
HMA Test Results**

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/24/09 @ 11:49 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1265** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	95	90	to 100
3/8"	84	78	to 90
#4	57		to
#8	37	35	to 43
#16	26		to
#30	18		to
#50	13		to
#100	9		to
#200	6.4	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	2.4	2.5	to 5.5
% VMA @ Ndes	13.1	12.5	to N/A
% VFA @ Ndes	81.7	65	to 75
Dust/Asphalt Ratio	1.4	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.485		154.7 lb/ft³
Gmb (ASTM D2726)	2.426		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			5.4
% Water (WSDOT FOP for AASHTO T 329)	0.19		2.0 max

Mix Temperature in °F	310
Oil Temperature in °F	330
Air Temperature in °F	71

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0	Gb (Binder)	1.028
Asphalt Content Design		5.6%		Mixing Temperature in °F	313
Anti Strip		0.00%		Compaction Temperature in °F	291
Pbe		4.5		Number of Gyration @ Initial	8
Gsb (Aggregate Blend)		2.64		Number of Gyration @ Design	100
Gsb (Fine Aggregate)		2.599		ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #92-152, ticket #245284. This truck was the 19th load of the day. The accumulative tonnage was 608.43. This is the second of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

X meets
Material _____
_____ fails to meet

above specifications.

Approved for
Distribution By:

Materials Engineer

Date

Tested and
Submitted by:

TEP 9/24/2009

Initial Date

Copies Distribution

2 Resident Engr.
1 Const. Admin.
1 Dens. Engineer

Nick G. 10/9/09



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/24/09 @ 11:49 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1265** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	12:57	2:29	3:05		
Tare Weight	510.0	510.0	510.0		
Sample + Tare Wt.	1403.8	1402.2	1402.1	Mass (Wt.) H ₂ O	1.7
Sample Weight	893.8	892.2	892.1	Percent H ₂ O	0.19

Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3010.4	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4709.5	Actual Asphalt Content in %:	5.4
Mass of Sample:	1699.1		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	6.34	Mass of Residual Agg. & Basket:	4603.9
Temperature Compensation (Ticket) in %:	0.18	Mass of Residual Agg. (Direct):	1593.5
Calibrated Asphalt Content (Ticket) in %:	5.63	Mass of Residual Agg. (Ticket):	1594.4
Difference of Masses of Residual Aggregate - Direct vs. Ticket = 0.1% Specification: shall be within $\pm 0.1\%$.			

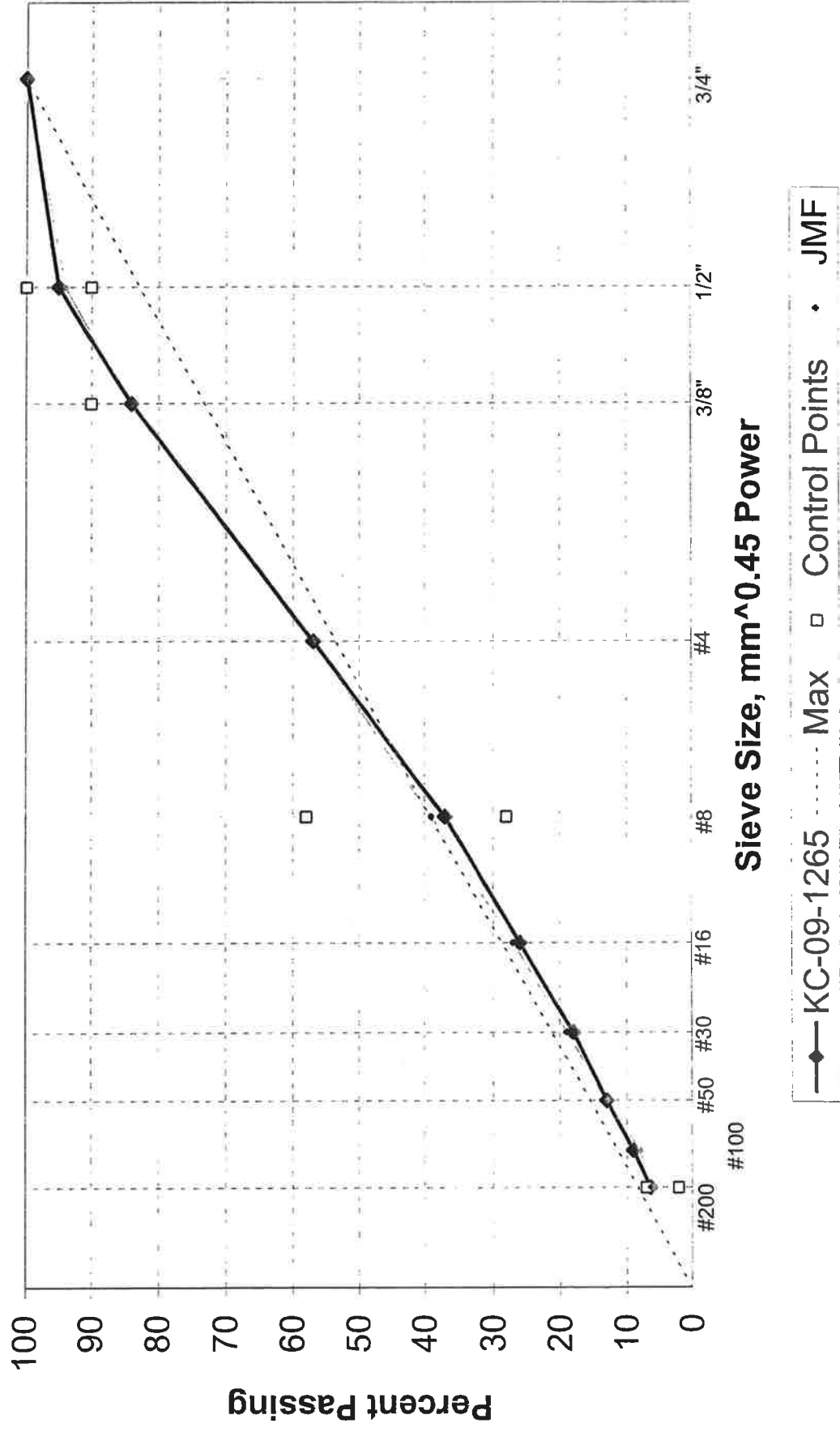
Sieve Analysis (AASHTO T30)							
Mass of Dry Washed Residual Aggregate:		1499.3					
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	76.2	95	94	90	100	90	100
3/8"	261.2	84	84	78	90	0	90
#4	692.3	57	57				
#8	1001.7	37	39	35	43	28	58
#16	1186.0	26	27				
#30	1304.4	18	19				
#50	1388.3	13	13				
#100	1446.5	9	8				
#200	1491.0	6.4	6.3	4.3	7.0	2.0	7.0
Pan	1499.3						

Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$

Remarks: **Bold = Within Tolerance Limits** *Black Italic = At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #92-152, ticket #245284. This truck was the 19th load of the day. The accumulative tonnage was 608.43. This is the second of two samples to be taken today. This mix contains 15% RAP. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material **X** meets _____ fails to meet _____ above specifications.

1/2 Inch HMA



KC-09-1265

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	310
Collection Date/Time	9/24/09 @ 11:49 AM	Oil Temp	330
Sample ID	KC-09-1265	Air Temp	71

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	4800.0		
Height in mm of Sample @ Initial Gyrations	125.9	8	Compaction Temp. = 291
Height in mm of Sample @ Design Gyrations	113.4	100	

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3010.4	Percent Loss (Ticket) in %:	6.34	
Mass of Basket & Sample	4709.5	Temp. Comp. (Ticket) in %:	0.18	Oil:
Sample Weight	1699.1	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4603.9	5.4

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	510.0	:	Min. test sample 500g.	
Sample + Tare Wt.	1403.8	Time	12:57	163 +/- 14° C for the oven temp.
Sample + Tare Wt.	1402.2	After 90 min.	2:29	Moist %:
Sample + Tare Wt.	1402.1	After 120 min.	3:05 (Use Military Time, ex. 00:00)	0.19

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1569.5
Mass of Pycnometer Under Water @ 25.0 °C	1277.5
Pycnometer Calibration @ 77°F	
Mass of Sample & Pycnometer Under Water	2215.4
Temperature of Water 25.0 ± 1.0 °C	24.8

	Min. Mass
1/2"	1500g
3/4"	2000g
1"	2500g

RICE:
154.7

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample	1499.3
----------------------------	--------

1 1/2"	#8	1001.7
1"	#16	1186.0
3/4"	0.0	#30 1304.4
1/2"	76.2	#50 1388.3
3/8"	261.2	#100 1446.5
#4	692.3	#200 1491.0
Pan		1499.3

Weight in Air	4778.7
Weight in Water	2812.2
Weight SSD	4782.3
Temp 25.0 ± 1.0 °C	25.0



HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1265** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			5.4
% Pass #200 Sieve			6.4
Gmm (Rice Specific Gravity)			2.485
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4800.0
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1569.5
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2215.4
(R) Temperature of Water in °C			24.8
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			1.00005
(V) $Gmm @ 25^{\circ}C = N \cdot U / (N - (Q - O))$			2.485
(W) $Density @ 25^{\circ}C = V \cdot 62.245 \text{ lb/ft}^3$			154.7
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4778.7
B = Mass in Grams of Surface-Dry Specimen in Air			4782.3
C = Mass in Grams of Specimen in Water			2812.2
Temperature of the Water °C			25.0
D = Temperature Correction for Density of Water			1.0000
$Gmb = D \cdot A / (B - C)$		(nearest 0.001)	2.426
$Absorption = ((B - A) / (B - C)) \cdot 100$		(nearest 0.001)	0.183%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			125.9
H @ Ndes (Height of Sample @ Design Gyration)			113.4
$\% Gmm @ Nini = (Hdes \cdot Gmb) / (Hini \cdot Gmm) \cdot 100$		(nearest 0.1)	87.9
$\% Gmm @ Ndes = (Gmb) / (Gmm) \cdot 100$		(nearest 0.1)	97.6
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
$Va = 100 \cdot (1 - (Gmb / Gmm))$	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	2.4
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
$VMA = 100 \cdot (1 - (Gmb \cdot Ps / (Gsb \cdot 100)))$	Mix Criteria = Min. 14.0%	(nearest 0.1)	13.1
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
$VFA = 100 \cdot [(VMA - Va) / VMA]$	Mix Criteria = 65 to 75	(nearest 0.1)	81.7
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
$Gse = (100 - Pb) / [(100 / Gmm) - (Pb / Gb)]$		(nearest 0.001)	2.704
$Pbe = -(Ps \cdot Gb) \cdot (Gse - Gsb) / (Gse \cdot Gsb) + Pb$		(nearest 0.1)	4.5
$Ps = 100 - Pb$		(nearest 0.1)	94.6
$D/A = \% \text{ Passing \#200 Sieve} / Pbe$	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.4



Mix Design Requirements and Specifications

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakesview** Mix ID: **MD090088** HMA Class: **1/2"**
Oil Source: **U.S. Oil** Resident Engineer: **Frank Overton**

Gradation						
Sieve Size	Contractor JMF		Tolerances		Control Points	
	% Passing		*LL	*UL	LL	UL
1 1/2"						
1"						
3/4"	100		99	100	100	100
1/2"	94		90	100	90	100
3/8"	84		78	90	0	90
#4	57		52	62		
#8	39		35	43	28	58
#16	27					
#30	19					
#50	13					
#100	8					
#200	6.3		4.3	7.0	2.0	7.0

Aggregate Source (Pit #)	B-333	B-160			
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to	<30
% Asphalt Content Design	5.6		5.1%	to	6.1%
% Anti Strip	0.00				
% Water					2% max
% Va @ Ndes	C 3.7		2.5	to	5.5
% VMA @Ndes	C 14.3		14	to	N/A
% VFA @ Ndes	C 74		65	to	75
Dust/Asphalt Ratio	C 1.4		0.6	to	1.6
Pbe	C 4.5				
Gmm	S 2.463	SE Specification			45
Gmb	S 2.374	Fracture	Single face		90%
			Double face		
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity			44% min.
Gsb (Fine Aggregate)	S 2.599				
Gb (Binder)	S 1.028				
Mixing Temperature in °F	313				
Max. Mixing Temperature in °F	350				
Compaction Temperature in °F	291				
Number of Gyrations @ Initial	8				
Number of Gyrations @ Design	100				
Number of Gyrations @ Max.	160				

Copies Distribution
2 Resident Engr.
1 Const. Admin.

*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



HMA Mineral Aggregate Results

Project: SE 416th St Overlay Project Number: M78030
Contractor: Woodworth Contract Number: C00455C09
Name of Source: Miles Sand and Gravel Roy Pit Sampling Location: Plant/Belt
Lab Sample Number: KC-09-1266 Collection Date: 9/24/2009 @ Afternoon
Mix ID: MD090088 Pit #: B-333 Sampled By: TEP HMA Class: 1/2"

Sand Equivalent Test (AASHTO T-176)

SE Value= $\frac{\text{Sand Reading (100)}}{\text{Clay Reading}}$

Clay Reading	Sand Reading	SE Value
6	3.6	60
Specification = 45 Min.		

Percentage of Fracture in Course Aggregate (AASHTO TP-61)

P = Percent of fracture

Q = Mass of questionable particles or borderline particles

F = Mass of fractured particles

N = Mass of unfractured particles

$$P = \left[\frac{F + \left(\frac{Q}{2} \right)}{F + Q + N} \right] * 100$$

Sieve Size	F	Q	N	P
1"				
3/4"				
1/2"	517.8	0.0	9.2	98
3/8"	377.3	0.0	16.5	96
#4	175.9	0.0	3.7	98

Specification =

Single Face = 90 %

Double Face =

Uncompacted Void Content of Fine Aggregate (AASHTO T-304)

V = Volume of cylindrical measure, ml

G = Bulk dry specific gravity fine agg. (G_{sb})

F = Net mass, g, of fine aggregate in measure

U = Uncompacted voids, percent, in the material

Preparation of Test Sample	
Sieve Size	Mass
#8 - #16	44 +/- 0.2 g
#16 - #30	57 +/- 0.2 g
#30 - #50	72 +/- 0.2 g
#50 - #100	17 +/- 0.2 g
Specification	44 Min.

Tare	185.64
------	--------

$$U = \left[\frac{V - \left(\frac{F}{G} \right)}{V} \right] * 100$$

V	F	G	U
100.0	137.15	2.599	47.2
100.0	137.03	2.599	47.3
Average			47

Remarks:

Material X meets
above specifications.
 fails to meet

Copies Distribution
2 Resident Engr.
1 Const. Admin.

Approved for
Distribution By:

Tested and
Submitted by:

LKW

9/29/2009

Materials Engineer

Date

Initial

Date

Pavers: Blaw Knox PF-5510 #711			
Remarks:			

Field Eng./Tester **Joe Karahuta** Date **9/28/2009**

Roller Codes:	SDV - Single Drum Vibrator	P-Pneumatic
	DDV Double Drum Vibrator	TS - Tandem Steel



**King County
Hot Mix Asphalt Compaction Form**

Date	9/24/09	Project	416th RAS Study				No.	Section	Troxler 4640B #2659				Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview
Class	1/2"	Lift	Wearing	Start Air Temp.	48	End Air Temp.	72	Gauge										
Estimated Density (p) =			0.0759 Tons/ft ³		Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)		200 Tons	Mix I.D.		2635.0 ft ³		Lot Length to nearest 100' (A) = $V(ft^3) / W(ft) \times D(ft)$ =		
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft		Sta. to Sta.	Loc.		Enumclaw		ACP Test Temp.				Lot #		15
Test	Location Code		Test Location		Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density					% of Rice	
1	Section #1		28+75		6' LT	0.17	142.1	142.4	142.3	1.007	143.2	154.6					92.7	
2	Section #1		31+18		4' LT	0.17	139.4	140.2	139.8	1.007	140.8	154.6					91.1	
3	Section #1		33+00		6' LT	0.17	143.1	144.8	144.0	1.007	145.0	154.6					93.8	
4	Section #1		34+52		6.5' LT	0.17	141.7	142.2	142.0	1.007	142.9	154.6					92.5	
5	Section #1		35+87		7' LT	0.17	141.3	143.4	142.4	1.007	143.3	154.6					92.7	
Lot Avg.															92.5			

Estimated Density (p) =			0.0759 Tons/ft ³		Width (W) =	Depth (D) =	Sublot Size (S)		Vol. of ACP in Sublot (V) =		Lot Length to nearest 100' (A)	
+ Sublot Ln. [(A) x 0.2] = (L)			238ft		Sta. to Sta.	Loc.		ACP Test Temp.				
Test	Location Code		Test Location		Offset	Depth	Gauge Readings		Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density
1												
2												
3												
4												
5												
Lot Avg.												

Field tests performed using KCDOT Test Method N-1.

Pavers:	Blaw Knox PF-5510 #711		
Remarks:			
Rollers	Breakdown	Intermediate	
	Sakai GW 750	IR 110 HF	
	P	DDV	
Passes	4 Vibe	4 Vibe	
		2-3 Static	
Lot Avg.			

Roller Codes: SDV - Single Drum Vibrator P-Pneumatic
DDV Double Drum Vibrator TS - Tandem Steel

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009

**SE 416th Street Overlay:
Shingles in Paving Demonstration**

Construction Inspection and Quality Control Testing

Paving Day 4 (9-25-09)

**Inspectors Daily Report
HMA Test Results
HMA Mineral Aggregate Test Results
HMA Compaction Test Results**

KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 1 of 2

DATE: Friday September 25th 2009

Federal Aid # _____

PROJECT NO. **M78030**

CONTRACT NO. **C00455C09**

PROJECT: _____

**SE 416th ST Overlay- Shingles in Paving
Demonstration**

INSPECTOR (S): _____

S. Shandil, M. Pavolka

CONTRACTOR: _____

Woodworth & Company

WEATHER: _____

Clear

TEMP: High **70**

Low **65**

WIND: Still ☒

Moderate ☒

High _____

Workable **8**

Nonworkable **0**

SIGNS AND TRAFFIC CONTROL CHECKED? Yes ☒

No _____

ON-SITE INTERVIEW? Yes _____

No ☒

WORK DONE:

- **Woodworth (Paving):** 7am Set up traffic control signs and flaggers on SE 416th st. Road closed between 228th and 2000' East of 212th ave. 7am Crew Remove paper joint at st # 36+50 and at 63+10. 7.15 Place tack on South side from 36+50 to 63+10. Mob. Equipment. 7.30 begin paving South side from st # 36+50 to 63+10. Luke operating shuttle buggy to transfer mix on to paver. Al operating Blaw Knox paver with Jonathan as screed operator. Shane using Sakai as b/down roller with Willie operating DD-110HF as intermediate/finish roller and the DD-28HF for d/ways and get compaction. 9.40 End paving at st# 63+10. Waited for 2 hours, place water to drop mat temperature on South side. 11.30 begin paving North side from st # 36+50 to 63+10. End paving at 2.40 pm. End paving at 2.40pm. Continued with compaction. Placed temp tapes, place water to drop mat temp. Road opened at 4.30pm.
- **Gloria Jeanne: (Grinding):** Complete on 09/21/09.

EQUIPMENT ON PROJECT:

- **Woodworth:** 1- F/M work truck (Chevy 2500HD), 1- Work truck (F 450 + Trailer # 38) 1 - Flagging truck (Chevy 2500 HD # 1264 and 1262), 1 Back Hoe (JD 510 # 203), 1- Shuttle Buggy (SB- 2500B # 715), 1- Paver (Blaw Knox # 711), 3 Rollers (I.R DD-28HF # 841, I.R DD-110HF # 810, Sakai GW 750 # 822 Pneumatic Roller), Ken worth Water Truck # 26, Peter Bilt Tack Truck # 9
- **Gloria Jeanne:**
- **PERSONNEL ON PROJECT:**
- **Woodworth:** 1- Project Manager (Scott Droppelman), 1- F/M (Dan Andreas), 1- Paver operators (Al Anderson), 1- Shuttle buggy operator (Luke Dillard), 1 - Screed operator (Jonathan Pullack), 2 - Roller operators (Shane Thomas, Willie Guillen), 2- Truck spotter (Penny Cochran), 1 - Raker (Ludvig Yefimov), 1 - Tack Operator (Luke Edwards), 1- TCS (Tara), 4- Flaggers (Glen, Katy, Ray and Paula), 1- Q.C (Renee Walton from CTL)
- **Gloria Jeanne:**
- **King County:** Joe (Lab)
- **Others:** Herb (WSDOT)

REMARKS:

- Road closed between 236Th ave and 2000' East of 212th ave. Flaggers at each major crossing to stop cars entering in to work zone from 7am to 5pm.
- Used Sakai as break down roller on 6 vibes, DD-110 as intermediate roller on 4 vibes, 2 static rolling pattern and DD-28 for Side driveways and compaction..
- Day 4 Paving was from station 36+50 to 63+10. Wood Worth haul mix from Lake View plant using 15 truck and trailers. Placed 865.11 Tons of HMA Class ½" PG 64-22 with 15% Rap and 3% RAS on Se 416th st at 2" compacted.
- All trucks came in with covered loads.
- Temp. Of mix on South side was 270 deg at 36+50, 280deg at 45+00 and 270 deg at 51+00. Temp. on the North side was 270 deg at 36+50, 266 deg at 40+00, 292 deg at 40+50, 290 deg at 50+00. It stayed within 290deg till end of day.

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____

**KING COUNTY DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES SECTION
INSPECTORS DAILY REPORT Page 2 of 2**

DATE: **Friday September 25th 2009**

- Call from Tara (lab) that 1st mix sample was 5.4 on oil & 7% on # 200, 2nd sample was 5.6 on oil and 7.2% on # 200.
- WSDOT core crew on site with Joe (LAB) to core mix that was placed today. (Mix had 3% RAS).
- Compaction was easy on Prelevel section South side from 36+50 to 43+00. It was difficult from 43+00 to 63+10.
- Removed pieces of wood, rubber, glass and wire from mat after been rolled.
- Contractor had to order more mix at end of day. Last load showed up after 45 Minutes.

INSPECTOR(S) TIME: _____

White - Contract File
Yellow - Project Engineer
Pink - Inspector's Diary

INSPECTOR'S SIGNATURE: _____



**King County
HMA Test Results**

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/25/09 @ 6:47 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1268** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	95	90	to 100
3/8"	87	78	to 90
#4	61		to
#8	42	35	to 43
#16	29		to
#30	21		to
#50	15		to
#100	11		to
#200	7.0	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	4.3	2.5	to 5.5
% VMA @ Ndes	14.7	12.5	to N/A
% VFA @ Ndes	70.7	65	to 75
Dust/Asphalt Ratio	1.6	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.489		154.9 lb/ft ³
Gmb (ASTM D2726)	2.383		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			5.5
% Water (WSDOT FOP for AASHTO T 329)	0.15		2.0 max

Mix Temperature in °F **341**
Oil Temperature in °F **330**
Air Temperature in °F **45**

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0
Asphalt Content Design		5.6%	
Anti Strip		0.00%	
Pbe		4.5	
Gsb (Aggregate Blend)		2.64	
Gsb (Fine Aggregate)		2.599	

Gb (Binder)	1.028
Mixing Temperature in °F	313
Compaction Temperature in °F	291
Number of Gyration @ Initial	8
Number of Gyration @ Design	100
ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #91-162, ticket #245361. This truck was the 5th load of the day. The accumulative tonnage was 160.01. This is the first of three samples to be taken today. This mix contains 15% RAP and 3% RAS. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

X meets
Material _____
_____ fails to meet

above specifications.

Approved for
Distribution By: _____

Materials Engineer

Date

Tested and
Submitted by: _____

TEP

9/25/2009

Initial

Date

Copies Distribution
2 Resident Engr.
1 Const. Admin.
1 Dens. Engineer

Victor by W 10/9/09



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/25/09 @ 6:47 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1268** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	8:29	10:02	10:50		
Tare Weight	507.5	507.5	507.5		
Sample + Tare Wt.	1226.8	1226.0	1225.7	Mass (Wt.) H ₂ O	1.1
Sample Weight	719.3	718.5	718.2	Percent H ₂ O	0.15

Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3010.7	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4578.6	Actual Asphalt Content in %:	5.5
Mass of Sample:	1567.9		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	6.34	Mass of Residual Agg. & Basket:	4483.3
Temperature Compensation (Ticket) in %:	0.19	Mass of Residual Agg. (Direct):	1472.6
Calibrated Asphalt Content (Ticket) in %:	5.62	Mass of Residual Agg. (Ticket):	1471.5

Difference of Masses of Residual Aggregate - Direct vs. Ticket = -0.1% Specification: shall be within $\pm 0.1\%$.

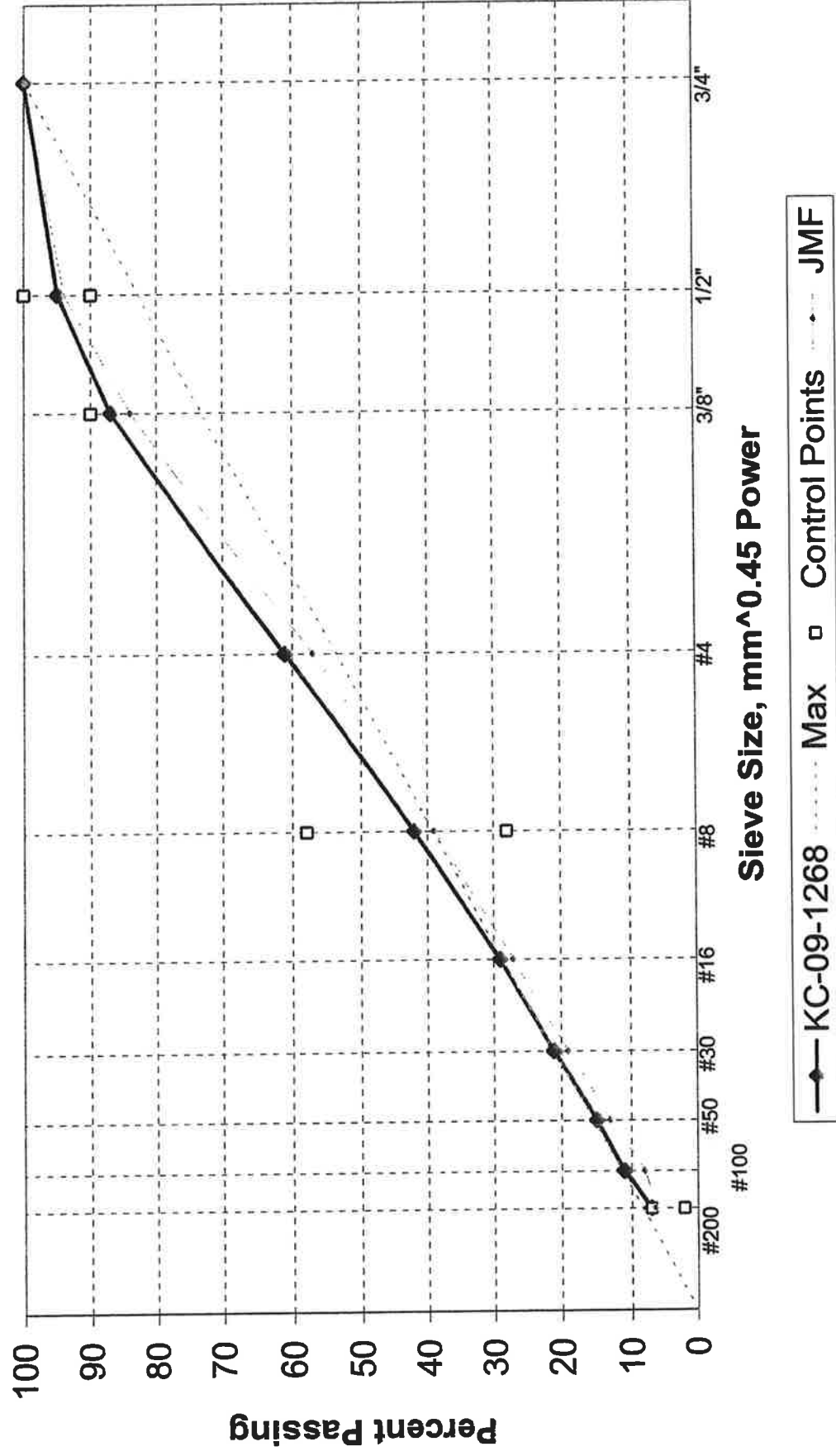
Sieve Analysis (AASHTO T30)							
Mass of Dry Washed Residual Aggregate:		1378					
Sieve Size	Accumulative	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves	Weight Retained			Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	72.0	95	94	90	100	90	100
3/8"	189.7	87	84	78	90	0	90
#4	567.2	61	57				
#8	856.7	42	39	35	43	28	58
#16	1046.4	29	27				
#30	1167.1	21	19				
#50	1251.1	15	13				
#100	1315.4	11	8				
#200	1368.9	7.0	6.3	4.3	7.0	2.0	7.0
Pan	1377.7						

Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$

Remarks: **Bold = Within Tolerance Limits** *Black Italic - At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Tara Pfaff. A companion sample was taken by Woodworth. Sample was obtained from truck #91-162, ticket #245361. This truck was the 5th load of the day. The accumulative tonnage was 160.01. This is the first of three samples to be taken today. This mix contains 15% RAP and 3% RAS. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material **X** meets _____ fails to meet _____ above specifications.

1/2 Inch HMA



KC-09-1268

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	341
Collection Date/Time	9/25/09 @ 6:47 AM	Oil Temp	330
Sample ID	KC-09-1268	Air Temp	45

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	4800.9		
Height in mm of Sample @ Initial Gyration	127	8	Compaction Temp. = 291
Height in mm of Sample @ Design Gyration	115.4	100	

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3010.7	Percent Loss (Ticket) in %:	6.34	
Mass of Basket & Sample	4578.6	Temp. Comp. (Ticket) in %:	0.19	Oil:
Sample Weight	1567.9	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4483.3	5.5

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	507.5	:	Min. test sample 500g.
Sample + Tare Wt.	1226.8	Time	8:29
Sample + Tare Wt.	1226.0	After 90 min.	10:02
Sample + Tare Wt.	1225.7	After 120 min.	10:50 (Use Military Time, ex. 00:00)
			Moist %: 0.15

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1642.1		
Mass of Pycnometer Under Water @ 25.0 °C	1277.5		
Pycnometer Calibration @ 77°F			
Mass of Sample & Pycnometer Under Water	2260.0		
Temperature of Water 25.0 ± 1.0 °C	25.4		

	Min. Mass
1/2"	1500g
3/4"	2000g
1"	2500g

RICE: 154.9

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample 1378.0

1 1/2"	#8	856.7
1"	#16	1046.4
3/4"	0.0	#30 1167.1
1/2"	72.0	#50 1251.1
3/8"	189.7	#100 1315.4
#4	567.2	#200 1368.9
Pan	1377.7	

Weight in Air	4776.5
Weight in Water	2784.3
Weight SSD	4788.6
Temp 25.0 ± 1.0 °C	25.0



HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1268** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			5.5
% Pass #200 Sieve			7.0
Gmm (Rice Specific Gravity)			2.489
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4800.9
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1642.1
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2260.0
(R) Temperature of Water in °C			25.4
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			0.99990
(V) Gmm @ 25°C = $N \cdot U / (N - (Q - O))$			2.489
(W) Density @ 25°C = $V \cdot 62.245 \text{ lb/ft}^3$			154.9
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4776.5
B = Mass in Grams of Surface-Dry Specimen in Air			4788.6
C = Mass in Grams of Specimen in Water			2784.3
Temperature of the Water °C			25.0
D = Temperature Correction for Density of Water			1.0000
Gmb = $D \cdot A / (B - C)$		(nearest 0.001)	2.383
Absorption = $((B - A) / (B - C)) \cdot 100$		(nearest 0.001)	0.604%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			127
H @ Ndes (Height of Sample @ Design Gyration)			115.4
% Gmm @ N ini = $(H_{des} \cdot G_{mb}) / (H_{ini} \cdot G_{mm}) \cdot 100$		(nearest 0.1)	87.0
% Gmm @ N des = $(G_{mb}) / (G_{mm}) \cdot 100$		(nearest 0.1)	95.7
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
Va = $100 \cdot (1 - (G_{mb} / G_{mm}))$	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	4.3
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
VMA = $100 \cdot (1 - (G_{mb} \cdot P_s / (G_{sb} \cdot 100)))$	Mix Criteria = Min. 14.0%	(nearest 0.1)	14.7
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
VFA = $100 \cdot [(VMA - Va) / VMA]$	Mix Criteria = 65 to 75	(nearest 0.1)	70.7
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
Gse = $(100 - Pb) / [(100 / G_{mm}) - (Pb / G_b)]$		(nearest 0.001)	2.713
Pbe = $-(P_s \cdot G_b) \cdot (G_{se} - G_{sb}) / (G_{se} \cdot G_{sb}) + Pb$		(nearest 0.1)	4.5
P _s = 100 - Pb		(nearest 0.1)	94.5
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.6



Mix Design Requirements and Specifications

Project: SE 416th St Overlay, Shingles in Paving Demo.	Project Number: M78030
Contractor: Woodworth & Co.	Contract Number: C004555C09
Asphalt Supplier: Woodworth Lakeview	Mix ID: MD090088 HMA Class: 1/2"
Oil Source: U.S. Oil	Resident Engineer: Frank Overton

Gradation							
Sieve Size	Contractor JMF		Tolerances		Control Points		
	% Passing				Class 1/2"		
			*LL	*UL	LL		UL
1 1/2"							
1"							
3/4"	100		99	100	100		100
1/2"	94		90	100	90		100
3/8"	84		78	90	0		90
#4	57		52	62			
#8	39		35	43	28		58
#16	27						
#30	19						
#50	13						
#100	8						
#200	6.3		4.3	7.0	2.0		7.0

Aggregate Source (Pit #)	B-333	B-160		
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to <30
% Asphalt Content Design	5.6		5.1%	to 6.1%
% Anti Strip	0.00			
% Water				2% max
% Va @ Ndes	C 3.7		2.5	to 5.5
% VMA @Ndes	C 14.3		14	to N/A
% VFA @ Ndes	C 74		65	to 75
Dust/Asphalt Ratio	C 1.4		0.6	to 1.6
Pbe	C 4.5			
Gmm	S 2.463	SE Specification		45
Gmb	S 2.374	Fracture	Single face	90%
			Double face	
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity		44% min.
Gsb (Fine Aggregate)	S 2.599			
Gb (Binder)	S 1.028			
Mixing Temperature in °F	313			
Max. Mixing Temperature in °F	350			
Compaction Temperature in °F	291			
Number of Gyrations @ Initial	8			
Number of Gyrations @ Design	100			
Number of Gyrations @ Max.	160			

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*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



King County
HMA Test Results

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/25/09 @ 7:59 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1276** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	95	90	to 100
3/8"	84	78	to 90
#4	57		to
#8	39	35	to 43
#16	27		to
#30	19		to
#50	14		to
#100	10		to
#200	7.2	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	2.4	2.5	to 5.5
% VMA @Ndes	14.1	12.5	to N/A
% VFA @ Ndes	83.0	65	to 75
Dust/Asphalt Ratio	1.4	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.464		153.4 lb/ft ³
Gmb (ASTM D2726)	2.404		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			5.7
% Water (WSDOT FOP for AASHTO T 329)	0.30		2.0 max

Mix Temperature in °F

Oil Temperature in °F 330

Air Temperature in °F

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0
Asphalt Content Design		5.6%	
Anti Strip		0.00%	
Pbe		4.5	
Gsb (Aggregate Blend)		2.64	
Gsb (Fine Aggregate)		2.599	

Gb (Binder)	1.028
Mixing Temperature in °F	313
Compaction Temperature in °F	291
Number of Gyration @ Initial	8
Number of Gyration @ Design	100
ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tim Hyden. A companion sample was taken by Woodworth. Sample was obtained from truck #10069T, ticket #245387. This truck was the 14th load of the day. The accumulative tonnage was 447.56. This is the second of three samples to be taken today. This mix contains 15% RAP and 3% RAS. This sample has failed to meet specifications for exceeding the tolerance of material passing the #200 screen. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material meets
X fails to meet

above specifications.

Approved for
Distribution By:

Materials Engineer

Date

Tested and
Submitted by:

TEP

9/25/2009

Initial

Date

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Const. Admin.

1

Dens. Engineer

Victor G. Nor 10/9/09



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/25/09 @ 7:59 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1276** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	9:12	10:55	11:29		
Tare Weight	559.4	559.4	559.4		
Sample + Tare Wt.	1490.2	1487.5	1487.4	Mass (Wt.) H ₂ O	2.8
Sample Weight	930.8	928.1	928.0	Percent H ₂ O	0.30

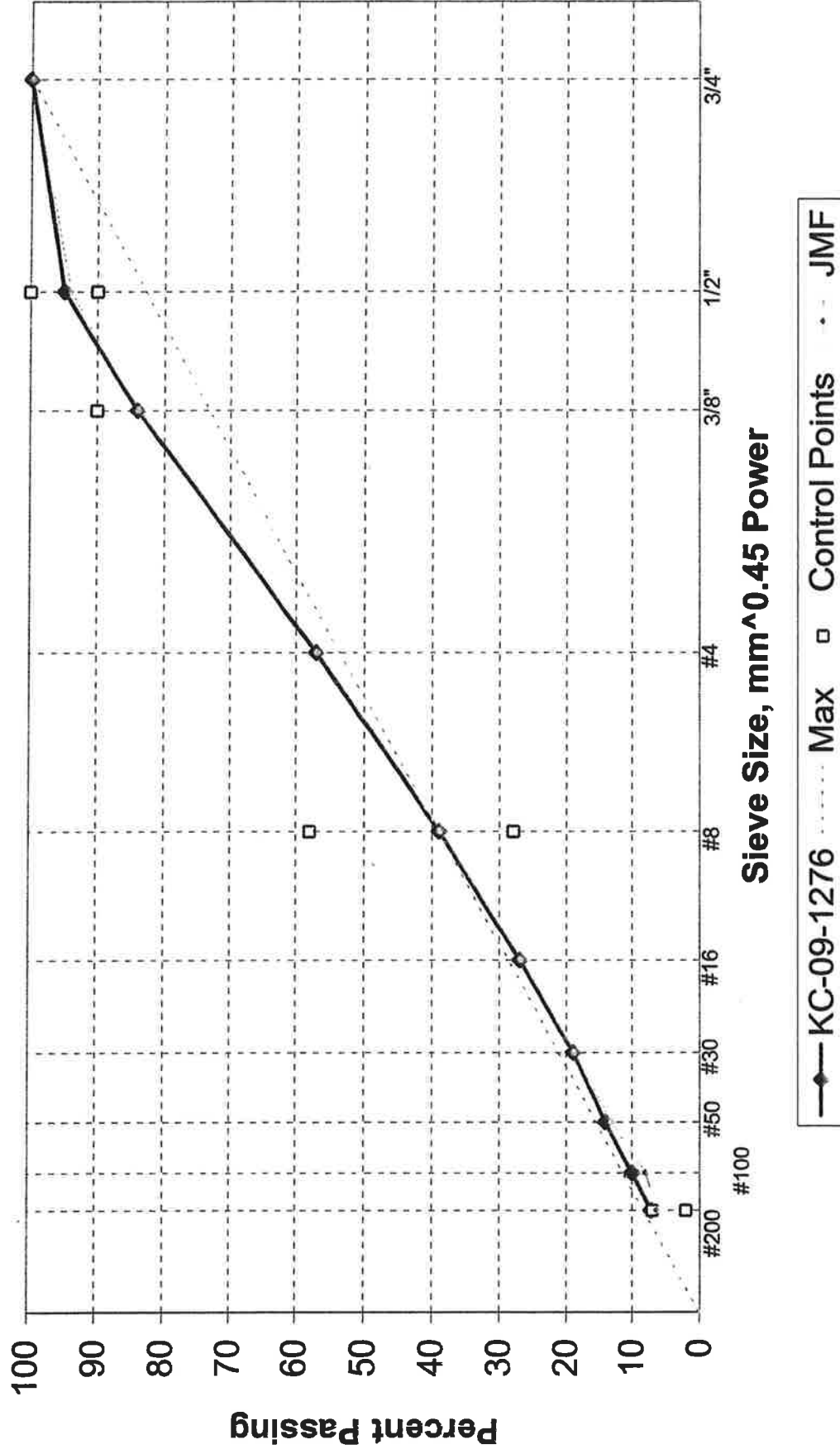
Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3057.9	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4787.5	Actual Asphalt Content in %:	5.7
Mass of Sample:	1729.6		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	6.69	Mass of Residual Agg. & Basket:	4673.6
Temperature Compensation (Ticket) in %:	0.17	Mass of Residual Agg. (Direct):	1615.7
Calibrated Asphalt Content (Ticket) in %:	5.99	Mass of Residual Agg. (Ticket):	1616.8
Difference of Masses of Residual Aggregate - Direct vs. Ticket = 0.1% Specification: shall be within $\pm 0.1\%$.			

Sieve Analysis (AASHTO T30)							
Mass of Dry Washed Residual Aggregate: 1510							
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	73.1	95	94	90	100	90	100
3/8"	252.1	84	84	78	90	0	90
#4	691.3	57	57				
#8	991.6	39	39	35	43	28	58
#16	1179.6	27	27				
#30	1306.1	19	19				
#50	1393.5	14	13				
#100	1453.2	10	8				
#200	1500.0	7.2	6.3	4.3	7.0	2.0	7.0
Pan	1509.8						
Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$							

Remarks: **Bold = Within Tolerance Limits** *Black Italic - At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Tim Hyden. A companion sample was taken by Woodworth. Sample was obtained from truck #10069T, ticket #245387. This truck was the 14th load of the day. The accumulative tonnage was 447.56. This is the second of three samples to be taken today. This mix contains 15% RAP and 3% RAS. This sample has failed to meet specifications for exceeding the tolerance of material passing the #200 screen. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material meets X fails to meet above specifications.

1/2 Inch HMA



KC-09-1276

Plant Information

Sampling Location Truck Bed @ Plant **Mix Temp** _____
Collection Date/Time 9/25/09 @ 7:59 AM **Oil Temp** 330
Sample ID KC-09-1276 **Air Temp** _____

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix. 4802.3
Height in mm of Sample @ Initial Gyrations 126.2 **8** **Compaction Temp. =** **291**
Height in mm of Sample @ Design Gyrations 114.1 **100**

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket 3057.9 **Percent Loss (Ticket) in %:** 6.69
Mass of Basket & Sample 4787.5 **Temp. Comp. (Ticket) in %:** 0.17 **Oil:**
Sample Weight 1729.6 **Ignition Furnace ID:** TIKI
Calibration Factor in %: 0.53 **Mass of Res. Agg. & Bask.** 4673.6 **5.7**

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight 559.4 **Min. test sample 500g.**
Sample + Tare Wt. 1490.2 **Time** 9:12 **163 +/- 14° C for the oven temp.**
Sample + Tare Wt. 1487.5 **After 90 min.** 10:55 **Moist %:**
Sample + Tare Wt. 1487.4 **After 120 min.** 11:29 **(Use Military Time, ex. 00:00)** **0.30**

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass 1620.6
Mass of Pycnometer Under Water @ 25.0 °C 1277.5
Pycnometer Calibration @ 77°F _____
Mass of Sample & Pycnometer Under Water 2240.3
Temperature of Water 25.0 ± 1.0 °C 24.9

	Min. Mass
1/2"	1500g
3/4"	2000g
1"	2500g

RICE:
153.4

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample 1510.0

1 1/2"		#8	991.6
1"		#16	1179.6
3/4"	0.0	#30	1306.1
1/2"	73.1	#50	1393.5
3/8"	252.1	#100	1453.2
#4	691.3	#200	1500.0
Pan	1509.8		

Weight in Air 4783.8
Weight in Water 2798.9
Weight SSD 4788.5
Temp 25.0 ± 1.0 °C 25.0



HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1276** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			5.7
% Pass #200 Sieve			7.2
Gmm (Rice Specific Gravity)			2.464
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4802.3
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1620.6
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2240.3
(R) Temperature of Water in °C			24.9
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			1.00003
(V) Gmm @ 25°C = $N \cdot U / (N - (Q - O))$			2.464
(W) Density @ 25°C = $V \cdot 62.245 \text{ lb/ft}^3$			153.4
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4783.8
B = Mass in Grams of Surface-Dry Specimen in Air			4788.5
C = Mass in Grams of Specimen in Water			2798.9
Temperature of the Water °C			25.0
D = Temperature Correction for Density of Water			1.0000
Gmb = $D \cdot A / (B - C)$		(nearest 0.001)	2.404
Absorption = $((B - A) / (B - C)) \cdot 100$		(nearest 0.001)	0.236%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			126.2
H @ Ndes (Height of Sample @ Design Gyration)			114.1
% Gmm @ N ini = $(H_{des} \cdot G_{mb}) / (H_{ini} \cdot G_{mm}) \cdot 100$		(nearest 0.1)	88.2
% Gmm @ N des = $(G_{mb}) / (G_{mm}) \cdot 100$		(nearest 0.1)	97.6
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
Va = $100 \cdot (1 - (G_{mb} / G_{mm}))$	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	2.4
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
VMA = $100 \cdot (1 - (G_{mb} \cdot P_s / (G_{sb} \cdot 100)))$	Mix Criteria = Min. 14.0%	(nearest 0.1)	14.1
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
VFA = $100 \cdot [(VMA - Va) / VMA]$	Mix Criteria = 65 to 75	(nearest 0.1)	83.0
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
Gse = $(100 - Pb) / [(100 / G_{mm}) - (Pb / G_b)]$		(nearest 0.001)	2.691
Pbe = $-(P_s \cdot G_b) \cdot (G_{se} - G_{sb}) / (G_{se} \cdot G_{sb}) + Pb$		(nearest 0.1)	5.0
P _s = 100 - Pb		(nearest 0.1)	94.3
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.4



Mix Design Requirements and Specifications

Project: SE 416th St Overlay, Shingles in Paving Demo.	Project Number: M78030
Contractor: Woodworth & Co.	Contract Number: C004555C09
Asphalt Supplier: Woodworth Lakeview	Mix ID: MD090088 HMA Class: 1/2"
Oil Source: U.S. Oil	Resident Engineer: Frank Overton

Gradation						
Sieve Size	Contractor JMF		Tolerances		Control Points	
	% Passing		*LL	*UL	LL	UL
1 1/2"						
1"						
3/4"	100		99	100	100	100
1/2"	94		90	100	90	100
3/8"	84		78	90	0	90
#4	57		52	62		
#8	39		35	43	28	58
#16	27					
#30	19					
#50	13					
#100	8					
#200	6.3		4.3	7.0	2.0	7.0

Aggregate Source (Pit #)	B-333	B-160		
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to <30
% Asphalt Content Design	5.6		5.1%	to 6.1%
% Anti Strip	0.00			
% Water				2% max
% Va @ Ndes	C 3.7		2.5	to 5.5
% VMA @Ndes	C 14.3		14	to N/A
% VFA @ Ndes	C 74		65	to 75
Dust/Asphalt Ratio	C 1.4		0.6	to 1.6
Pbe	C 4.5			
Gmm	S 2.463	SE Specification		45
Gmb	S 2.374	Fracture	Single face	90%
			Double face	

Gsb (Aggregate Blend)	S	2.640	Fine Aggregate Angularity	44% min.
Gsb (Fine Aggregate)	S	2.599		
Gb (Binder)	S	1.028		
Mixing Temperature in °F		313		
Max. Mixing Temperature in °F		350		
Compaction Temperature in °F		291		
Number of Gyrations @ Initial		8		
Number of Gyrations @ Design		100		
Number of Gyrations @ Max.		160		

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*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



**King County
HMA Test Results**

Project: **SE 416th St Overlay, Shingles in Paving Demo.** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/25/09 @ 11:17 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1278** HMA Class: **1/2"**

Gradation (AASHTO T 30)

Sieve Size	% Passing	Tolerances	
		*LL	*UL
1 1/2"			to
1"			to
3/4"	100	99	to 100
1/2"	92	90	to 100
3/8"	83	78	to 90
#4	57		to
#8	38	35	to 43
#16	26		to
#30	19		to
#50	13		to
#100	10		to
#200	6.8	4.3	to 7.0

Volumetrics (AASHTO T 312)

		Tolerances	
		*LL	*UL
% Va @ Ndes	2.7	2.5	to 5.5
% VMA @ Ndes	14.2	12.5	to N/A
% VFA @ Ndes	81.0	65	to 75
Dust/Asphalt Ratio	1.4	0.6	to 1.6
Gmm (WSDOT FOP for AASHTO T 209)	2.472		153.9 lb/ft ³
Gmb (ASTM D2726)	2.405		
Asphalt Content % (KCDOT FOP for AASHTO T 308)			5.8
% Water (WSDOT FOP for AASHTO T 329)	0.19		2.0 max

Mix Temperature in °F	329
Oil Temperature in °F	330
Air Temperature in °F	57

*LL=Lower Limit UL=Upper Limit

Data from Mix Design

Aggregate Source	B-333	B-160	0	Gb (Binder)	1.028
Asphalt Content Design		5.6%		Mixing Temperature in °F	313
Anti Strip		0.00%		Compaction Temperature in °F	291
Pbe		4.5		Number of Gyration @ Initial	8
Gsb (Aggregate Blend)		2.64		Number of Gyration @ Design	100
Gsb (Fine Aggregate)		2.599		ESAL'S (millions)	3 to <30

Remarks:

Sample was obtained by King County Representative Tim Hyden. A companion sample was taken by Woodworth. Sample was obtained from truck #82-182, ticket #245461. This truck was the 19th load of the day. The accumulative tonnage was 610.88. This is the third of three samples to be taken today. This mix contains 15% RAP and 3% RAS. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

X meets
Material _____
_____ fails to meet

above specifications.

Approved for
Distribution By:

Materials Engineer

Date

Tested and
Submitted by:

TEP 9/25/2009

Initial Date

Victor Y. Nov
10/9/09

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1 Dens. Engineer



Ignition Furnace Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **M78030**
Contractor: **Woodworth & Co.** Contract Number: **C004555C09**
Asphalt Supplier: **Woodworth Lakeview** Sampling Location: **Truck Bed @ Plant**
Oil Source and Grade: **U.S. Oil** Collection Date/Time: **9/25/09 @ 11:17 AM**
Mix ID: **MD090088** Sample ID: **KC-09-1278** HMA Class: **1/2"**

Moisture Content (WSDOT FOP for AASHTO T329)					
	Initial	After 90 min.	After 120 min.		
Time	12:39	2:05	2:48		
Tare Weight	508.0	508.0	508.0		
Sample + Tare Wt.	1233.1	1231.7	1231.7	Mass (Wt.) H ₂ O	1.4
Sample Weight	725.1	723.7	723.7	Percent H ₂ O	0.19

Ignition Furnace Data (AASHTO T 308)			
Mass of Empty Basket(s):	3011.1	Ignition Furnace ID:	TIKI
Mass of Baskets and Sample:	4868.2	Actual Asphalt Content in %:	5.8
Mass of Sample:	1857.1		
Calibration Factor (Ticket) in %:	0.53	Mix Design Asphalt Content in %:	5.6
Percent Loss (Ticket) in %:	6.65	Mass of Residual Agg. & Basket:	4745.3
Temperature Compensation (Ticket) in %:	0.16	Mass of Residual Agg. (Direct):	1734.2
Calibrated Asphalt Content (Ticket) in %:	5.96	Mass of Residual Agg. (Ticket):	1736.6
Difference of Masses of Residual Aggregate - Direct vs. Ticket = 0.1% Specification: shall be within $\pm 0.1\%$.			

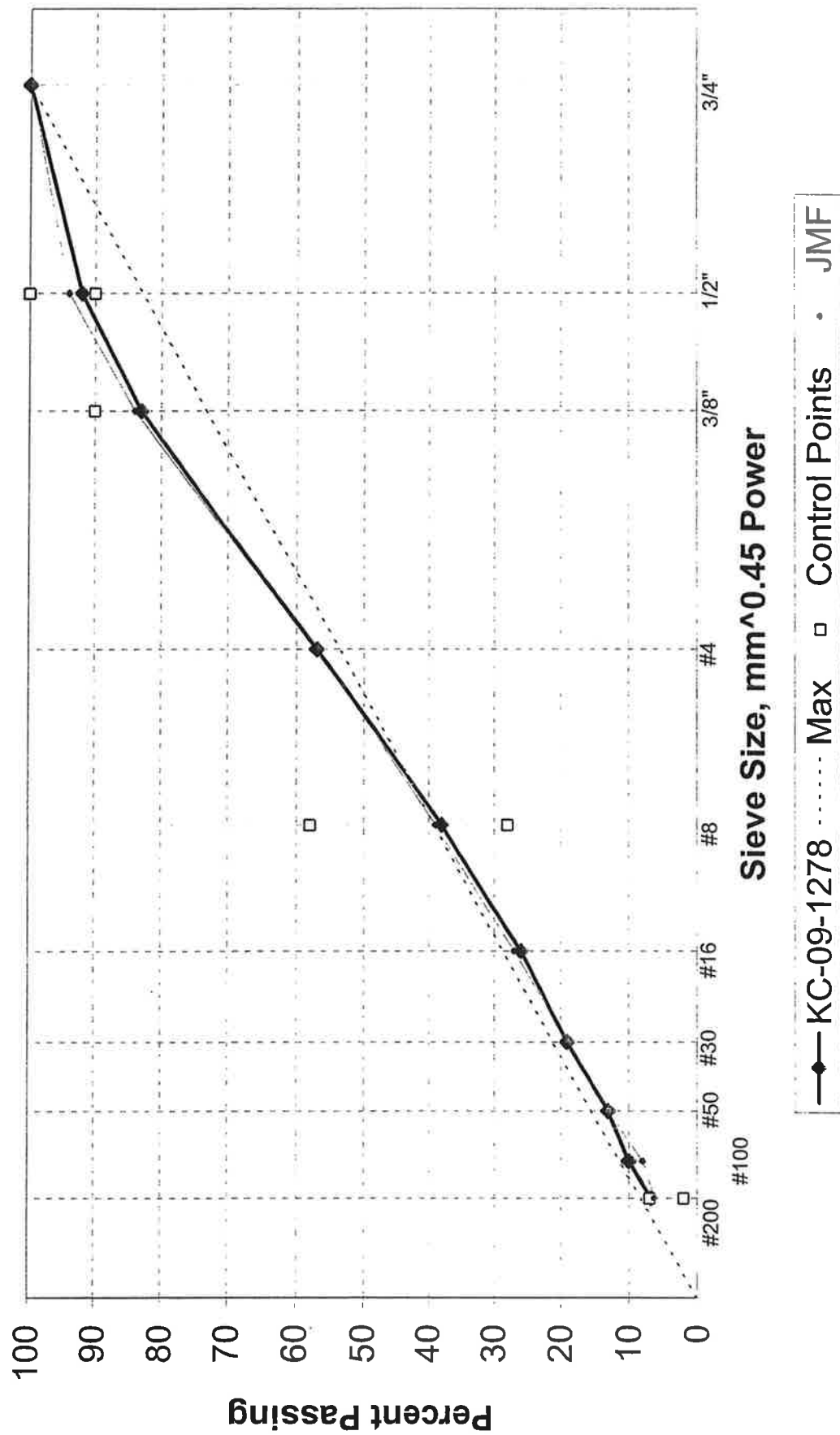
Sieve Analysis (AASHTO T30)							
Mass of Dry Washed Residual Aggregate:		1624.5					
Sieve Size	Accumulative Weight Retained	Percent Passing	JMF	Tolerance		Control Points	
*Record all sieves				Lower Limit	Upper Limit	Lower Limit	Upper Limit
Sieve Size							
1 1/2"							
1"							
3/4"	0.0	100	100	99	100	100	100
1/2"	147.3	92	94	90	100	90	100
3/8"	296.0	83	84	78	90	0	90
#4	741.7	57	57				
#8	1074.2	38	39	35	43	28	58
#16	1278.0	26	27				
#30	1411.1	19	19				
#50	1504.2	13	13				
#100	1568.4	10	8				
#200	1616.6	6.8	6.3	4.3	7.0	2.0	7.0
Pan	1624.5						

Difference of Masses - Pan vs. Washed = 0.0% Specification: shall be within $\pm 0.2\%$

Remarks: **Bold = Within Tolerance Limits** *Black Italic - At Tolerance Limit* Red = Outside Tolerance Limit
Sample was obtained by King County Representative Tim Hyden. A companion sample was taken by Woodworth. Sample was obtained from truck #82-182, ticket #245461. This truck was the 19th load of the day. The accumulative tonnage was 610.88. This is the third of three samples to be taken today. This mix contains 15% RAP and 3% RAS. Ignition Furnace Calibration Factor changed from 0.63 to 0.53.

Material **X** meets _____ fails to meet _____ above specifications.

1/2 Inch HMA



KC-09-1278

Plant Information

Sampling Location	Truck Bed @ Plant	Mix Temp	329
Collection Date/Time	9/25/09 @ 11:17 AM	Oil Temp	330
Sample ID	KC-09-1278	Air Temp	57

Gyratory Data (AASHTO T 312)

Initial wt. of Uncompacted mix.	4807.9		
Height in mm of Sample @ Initial Gyration	127.4	8	Compaction Temp. = 291
Height in mm of Sample @ Design Gyration	114.9	100	

Ignition Furnace (AASHTO T 308)

Mass of Empty Basket	3011.1	Percent Loss (Ticket) in %:	6.65	
Mass of Basket & Sample	4868.2	Temp. Comp. (Ticket) in %:	0.16	Oil:
Sample Weight	1857.1	Ignition Furnace ID:	TIKI	
Calibration Factor in %:	0.53	Mass of Res. Agg. & Bask.	4745.3	5.8

Moisture Content (WSDOT FOP for AASHTO T 329)

Tare Weight	508.0		Min. test sample 500g.	
Sample + Tare Wt.	1233.1	Time	12:39	163 +/- 14° C for the oven temp.
Sample + Tare Wt.	1231.7	After 90 min.	2:05	Moist %:
Sample + Tare Wt.	1231.7	After 120 min.	2:48 (Use Military Time, ex. 00:00)	0.19

Rice Data (ASTM D 2041)

30 mm or less Hg at 15 min.

Sample Mass	1557.0			
Mass of Pycnometer Under Water @ 25.0 °C	1277.5			RICE:
Pycnometer Calibration @ 77°F				153.9
Mass of Sample & Pycnometer Under Water	2204.7			
Temperature of Water 25.0 ± 1.0 °C	25.2			

	Min. Mass
1/2"	1500g
3/4"	2000g
1"	2500g

Sieve Analysis (AASHTO T 30)

Bulk Specific Gravity

Mass of Dry, Washed Sample 1624.5

1 1/2"	#8	1074.2
1"	#16	1278.0
3/4"	0.0	#30 1411.1
1/2"	147.3	#50 1504.2
3/8"	296.0	#100 1568.4
#4	741.7	#200 1616.6
Pan	1624.5	

Weight in Air	4789.8
Weight in Water	2804.0
Weight SSD	4795.3
Temp 25.0 ± 1.0 °C	24.9



HMA Volumetric Worksheet

Project: **SE 416th St Overlay, Shingles in Paving Demo** Project Number: **C004555C09**
Mix ID: **MD090088** Sample ID: **KC-09-1278** HMA Class: **1/2"**

Required Data			
Percent Binder (Pb)			5.8
% Pass #200 Sieve			6.8
Gmm (Rice Specific Gravity)			2.472
Compaction Temperature in °F			291
Initial Weight of Uncompacted Mixture			4807.9
Number of Gyration @ Initial			8
Number of Gyration @ Design			100
Gb (Specific Gravity of the Binder)			1.028
Gsb (Bulk Specific Gravity of the Aggregate Blend)			2.64
Theoretical Maximum Specific Gravity "Gmm" (ASTM D 2041)			
(N) Sample Mass			1557
(O) Mass of Pycnometer Under Water			1277.5
(P) Pycnometer Calibration @ 77°F			
(Q) Mass of Sample & Pycnometer Under Water			2204.7
(R) Temperature of Water in °C			25.2
(S) Pycnometer Calibration @ Test Temperature			
(T) Bitumen Thermal Correction			
(U) Water Thermal Correction			0.99995
(V) Gmm @ 25°C = $N \cdot U / (N - (Q - O))$			2.472
(W) Density @ 25°C = $V \cdot 62.245 \text{ lb/ft}^3$			153.9
Bulk Specific Gravity "Gmb" (ASTM D2726)			
A = Mass in Grams of Specimen in Air			4789.8
B = Mass in Grams of Surface-Dry Specimen in Air			4795.3
C = Mass in Grams of Specimen in Water			2804.0
Temperature of the Water °C			24.9
D = Temperature Correction for Density of Water			1.0000
Gmb = $D \cdot A / (B - C)$		(nearest 0.001)	2.405
Absorption = $((B - A) / (B - C)) \cdot 100$		(nearest 0.001)	0.276%
Gyratory Compactor Data (AASHTO T 312)			
H @ Nini (Height of Sample @ Initial Gyration)			127.4
H @ Ndes (Height of Sample @ Design Gyration)			114.9
% Gmm @ N ini = $(H_{des} \cdot G_{mb}) / (H_{ini} \cdot G_{mm}) \cdot 100$		(nearest 0.1)	87.7
% Gmm @ N des = $(G_{mb}) / (G_{mm}) \cdot 100$		(nearest 0.1)	97.3
Air Voids (Va) {WSDOT Std. Spec. 9-03.8(7)}			
Va = $100 \cdot (1 - (G_{mb} / G_{mm}))$	JMF Tolerance = 2.5% to 5.5%	(nearest 0.1)	2.7
Voids in Mineral Aggregate (VMA) {WSDOT Std. Spec. 9-03.8(7)}			
VMA = $100 \cdot (1 - (G_{mb} \cdot P_s / (G_{sb} \cdot 100)))$	Mix Criteria = Min. 14.0%	(nearest 0.1)	14.2
Voids Filled With Asphalt (VFA) {WSDOT Std. Spec. 9-03.8(7)}			
VFA = $100 \cdot [(VMA - Va) / VMA]$	Mix Criteria = 65 to 75	(nearest 0.1)	81.0
Dust / Asphalt Ratio (D/A) {WSDOT Std. Spec. 9-03.8(2)}			
Gse = $(100 - Pb) / [(100 / G_{mm}) - (Pb / G_b)]$		(nearest 0.001)	2.706
Pbe = $-(P_s \cdot G_b) \cdot (G_{se} - G_{sb}) / (G_{se} \cdot G_{sb}) + Pb$		(nearest 0.1)	4.9
P_s = 100 - Pb		(nearest 0.1)	94.2
D/A = % Passing #200 Sieve / Pbe	Mix Criteria = 0.6 to 1.6	(nearest 0.1)	1.4



Mix Design Requirements and Specifications

Project: SE 416th St Overlay, Shingles in Paving Demo.	Project Number: M78030
Contractor: Woodworth & Co.	Contract Number: C004555C09
Asphalt Supplier: Woodworth Lakeview	Mix ID: MD090088 HMA Class: 1 1/2"
Oil Source: U.S. Oil	Resident Engineer: Frank Overton

Gradation

Sieve Size	Contractor JMF		Tolerances		Control Points	
	% Passing		*LL	*UL	LL	UL
1 1/2"						
1"						
3/4"	100		99	100	100	100
1/2"	94		90	100	90	100
3/8"	84		78	90	0	90
#4	57		52	62		
#8	39		35	43	28	58
#16	27					
#30	19					
#50	13					
#100	8					
#200	6.3		4.3	7.0	2.0	7.0

Aggregate Source (Pit #)	B-333	B-160			
Binder Grade (PG)	64-22	ESAL'S (millions)	3	to	<30
% Asphalt Content Design	5.6		5.1%	to	6.1%
% Anti Strip	0.00				
% Water					2% max
% Va @ Ndes	C 3.7		2.5	to	5.5
% VMA @Ndes	C 14.3		14	to	N/A
% VFA @ Ndes	C 74		65	to	75
Dust/Asphalt Ratio	C 1.4		0.6	to	1.6
Pbe	C 4.5				
Gmm	S 2.463	SE Specification			45
Gmb	S 2.374	Fracture	Single face		90%
			Double face		
Gsb (Aggregate Blend)	S 2.640	Fine Aggregate Angularity			44% min.
Gsb (Fine Aggregate)	S 2.599				
Gb (Binder)	S 1.028				
Mixing Temperature in °F	313				
Max. Mixing Temperature in °F	350				
Compaction Temperature in °F	291				
Number of Gyrations @ Initial	8				
Number of Gyrations @ Design	100				
Number of Gyrations @ Max.	160				

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2	Resident Engr.
1	Const. Admin.

*LL=Lower Limit UL=Upper Limit C = Use Contractors Information S = Use WSDOT Information



HMA Mineral Aggregate Results

Project: **SE 416th St Overlay** Project Number: **M78030**
Contractor: **Woodworth** Contract Number: **C00455C09**
Name of Source: **Miles Sand and Gravel Roy Pit** Sampling Location: **Plant/Belt**
Lab Sample Number: **KC-09-1269** Collection Date: **9/25/2009 @ Afternoon**
Mix ID: **MD090088** Pit #: **B-333** Sampled By: **TEP** HMA Class: **1/2"**

Sand Equivalent Test (AASHTO T-176)

SE Value = $\frac{\text{Sand Reading (100)}}{\text{Clay Reading}}$

Clay Reading	Sand Reading	SE Value
5.5	3.3	60
Specification = 45 Min.		

Percentage of Fracture in Course Aggregate (AASHTO TP-61)

P = Percent of fracture

Q = Mass of questionable particles or borderline particles

F = Mass of fractured particles

N = Mass of unfractured particles

$$P = \left[\frac{F + \left(\frac{Q}{2} \right)}{F + Q + N} \right] * 100$$

Sieve Size	F	Q	N	P
1"				
3/4"				
1/2"	82.7	0.0	7.0	92
3/8"	126.3	0.0	7.1	95
#4	32.1	0.0	1.2	96

Specification = Single Face = 90 % Double Face =

Uncompacted Void Content of Fine Aggregate (AASHTO T-304)

V = Volume of cylindrical measure, ml

G = Bulk dry specific gravity fine agg. (G_b)

F = Net mass, g, of fine aggregate in measure

U = Uncompacted voids, percent, in the material

Preparation of Test Sample	
Sieve Size	Mass
#8 - #16	44 +/- 0.2 g
#16 - #30	57 +/- 0.2 g
#30 - #50	72 +/- 0.2 g
#50 - #100	17 +/- 0.2 g
Specification	44 Min.

Tare 185.64

$$U = \left[\frac{V - \left(\frac{F}{G} \right)}{V} \right] * 100$$

V	F	G	U
100.0	137.11	2.599	47.2
100.0	137.13	2.599	47.2
Average			47

Remarks:

Material X meets
above specifications.
_____ fails to meet

Copies Distribution
2 Resident Engr.
1 Const. Admin.

Approved for
Distribution By:

Tested and
Submitted by:

LKW 9/28/2009

Materials Engineer

Date

Initial

Date



HMA Mineral Aggregate Results

Project: **SE 416th St Overlay** Project Number: **M78030**
Contractor: **Woodworth** Contract Number: **C00455C09**
Name of Source: **Miles Sand and Gravel Roy Pit** Sampling Location: **Plant/Belt**
Lab Sample Number: **KC-09-1279** Collection Date: **9/25/2009 @ Afternoon**
Mix ID: **MD090088** Pit #: **B-333** Sampled By: **TEP** HMA Class: **1/2"**

Sand Equivalent Test (AASHTO T-176)

SE Value = $\frac{\text{Sand Reading (100)}}{\text{Clay Reading}}$

Clay Reading	Sand Reading	SE Value
5.9	3.2	55
Specification = 45 Min.		

Percentage of Fracture in Course Aggregate (AASHTO TP-61)

P = Percent of fracture

Q = Mass of questionable particles or borderline particles

F = Mass of fractured particles

N = Mass of unfractured particles

$$P = \left[\frac{F + \left(\frac{Q}{2} \right)}{F + Q + N} \right] * 100$$

Sieve Size	F	Q	N	P
1"				
3/4"				
1/2"	406.5	0.0	7.7	98
3/8"	667.5	0.0	5.0	99
#4	137.6	0.0	0.6	100

Specification = Single Face = 90 % Double Face =

Uncompacted Void Content of Fine Aggregate (AASHTO T-304)

V = Volume of cylindrical measure, ml

G = Bulk dry specific gravity fine agg. (G_b)

F = Net mass, g, of fine aggregate in measure

U = Uncompacted voids, percent, in the material

Preparation of Test Sample	
Sieve Size	Mass
#8 - #16	44 +/- 0.2 g
#16 - #30	57 +/- 0.2 g
#30 - #50	72 +/- 0.2 g
#50 - #100	17 +/- 0.2 g
Specification	44 Min.

Tare 185.64

$$U = \left[\frac{V - \left(\frac{F}{G} \right)}{V} \right] * 100$$

V	F	G	U
100.0	138.01	2.599	46.9
100.0	137.56	2.599	47.1
Average			47

Remarks:

Material X meets
above specifications.
 fails to meet

Approved for
Distribution By:

Tested and
Submitted by:

CW 9/29/2009

Materials Engineer

Date

Initial

Date

Copies Distribution
 2 Resident Engr.
 1 Const. Admin.



King County Hot Mix Asphalt Compaction Form

Date	9/25/09	Project	416th RAS Study				No.	Section	Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview					
Class	1/2"	Lift	Start Air Temp.	50	End Air Temp.	79	Gauge	Troxler 4640B #2659		Mix I.D.	MD090088		Rand. #						
Estimated Density (p) =		0.0759 Tons/ft ³		Width (W) =		Depth (D) =		Sublot Size (S)		200 Tons		2635.0 ft ³		Lot Length to nearest 100' (A) = = V/(R ³) / W(R ³) x D(R ³) =		1190ft			
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft		Sta. to Sta.		Enumclaw		ACP Test Temp.		Lot #		16				
Test	Location Code		Test Location				Offset	Depth	Gauge Readings				Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice		
1	Section #2		37+40				3' LT	0.17	141.7	142.6	142.2	0.999	142.0	154.9	91.7				
2	Section #2		39+60				5.5' LT	0.17	147.5	148.0	147.8	0.999	147.6	154.9	95.3				
3	Section #2		41+35				9' LT	0.17	144.2	144.7	144.5	0.999	144.3	154.9	93.2				
4	Section #2		43+15				6.5' LT	0.17	138.4	136.8	137.6	0.999	137.5	154.9	88.7				
5	Section #2		45+60				2.5' LT	0.17	138.4	138.9	138.7	0.999	138.5	154.9	89.4				
														Lot Avg.		91.7			
Estimated Density (p) =		0.0759 Tons/ft ³		Width (W) =		Depth (D) =		Sublot Size (S)		200 Tons		Vol. of ACP in Sublot (V) = (S)(p) =		2635.0 ft ³		Lot Length to nearest 100' (A) = = V/(R ³) / W(R ³) x D(R ³) =		1190ft	
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft		Sta. to Sta.		Enumclaw		ACP Test Temp.		Lot #		17				
Test	Location Code		Offset	Depth	Gauge Readings				Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice						
1	Section #2		7' LT	0.17	140.8	140.8	140.8	0.999	140.7	154.9	90.8								
2	Section #2		4' LT	0.17	139.0	139.4	139.2	0.999	139.1	154.9	89.8								
3	Section #2		10.5' LT	0.17	141.6	141.6	141.6	0.999	141.5	154.9	91.3								
4	Section #2		2.5' LT	0.17	139.3	141.8	140.6	0.999	140.4	154.9	90.6								
5	Section #2		6.5' LT	0.17	145.3	145.4	145.4	0.999	145.2	154.9	93.7								
														Lot Avg.		91.3			

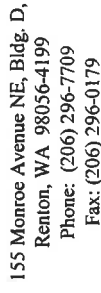
Field tests performed using KCDOT Test Method N-1.			
Pavers:	Blaw Knox PF-5510 #711		
Remarks:	Woodworth paved test section #1 on the plan sheet they planned to pave 1000 tons. The asphalt placed today had 15% RAP and 3% RAS.		

Rollers	Breakdown	Intermediate
Sakai GW 750 P	IR 110 HF DDV	
Passes	4 Vibe	4 Vibe
	2-3 Static	

Roller Codes:	
SDV - Single Drum Vibrator	P-Pneumatic
DDV Double Drum Vibrator	TS - Tandem Steel

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester Joe Karahuta Date 9/28/2009

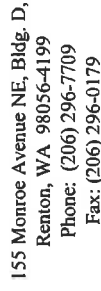


King County Hot Mix Asphalt Compaction Form

Date	9/25/09	Project	416th RAS Study				No.	Section	Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview			
Class	1/2"	Lift	Start Air Temp.	50	End Air Temp.	79	Gauge	Troxler 4640B #2659						Plant	Lakeview		
Estimated Density (p) =			0.0759 Tons/ft ³	Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons	2635.0 ft ³				Lot Length to nearest 100' (A) = $\sqrt[3]{(W^3) / (Wft) \times D(ft)}$			
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft	Sta. to Sta.	Loc.		Enumclaw		ACP Test Temp.		Lot #	18			
Test	Location Code		Test Location				Offset	Depth	Gauge Readings			Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice	
1	Section #2		59+05				3.5' LT	0.17	143.3	142.7	143.0			0.999	142.9	154.9	92.2
2	Section #2		60+60				9' LT	0.17	144.8	146.2	145.5			0.999	145.4	154.9	93.8
3	Section #2		62+50				5' LT	0.17	142.9	145.8	144.4			0.999	144.2	154.9	93.1
4	Section #2		37+05				5.5' RT	0.17	144.7	142.6	143.7			0.999	143.5	154.9	92.6
5	Section #2		39+50				8' RT	0.17	143.3	144.0	143.7			0.999	143.5	154.9	92.6
Lot Avg. 92.9																	
Estimated Density (p) =			0.0759 Tons/ft ³	Width (W) =		Depth (D) =		Sublot Size (S)		Vol. of ACP in Sublot (V) = $(SV/p) =$			Lot Length to nearest 100' (A) = $\sqrt[3]{(W^3) / (Wft) \times D(ft)}$				
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft	Sta. to Sta.	Loc.		ACP Test Temp.		Lot #		%				
Test	Location Code						Offset	Depth	Gauge Readings			Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice	
1																	
2																	
3																	
4																	
5																	
Field tests performed using KCDOT Test Method N-1.																	
Pavers: Blaw Knox PF-5510 #711																	
Remarks: Woodworth paved test section #1 on the plan sheet they plan to pave 1000 tons. The asphalt placed today had 15% RAP and 3% RAS.																	
Rollers									Breakdown				Intermediate				
									Sakal GW 750 P				IR 110 HF DDV				
Passes									4 Vibe				4 Vibe 2-3 Static				
Roller Codes: SDV - Single Drum Vibrator P-Pneumatic																	

Tester informed paving contractor and K.C. Inspector of the day's test results.

Field Eng./Tester: Joe Karahuta Date: 9/28/2009



Date	9/25/09		Project	416th RAS Study				No.	Section		Prime	Woodworth	Paving Co.	Woodworth	Plant	Lakeview		
Class	1/2"	Lift	Start Air Temp.		50	End Air Temp.		79	Troxler 4640B #2659			Mix I.D.	MD090088		Rand. #			
Estimated Density (ρ) =		0.0759 Tons/ft3		Width (W) =		13ft	Depth (D) =		0.17ft	Sublot Size (S)		2635.0 ft3		Lot Length to nearest 100' (A) = $\sqrt{W(D)} \times D(W)$		1190ft		
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)		238ft		Sta. to Sta.		Enumclaw		ACP Test Temp.		Lot #		19			
Test	Location Code		Test Location				Offset		Depth		Gauge Readings		Avg. Reading		Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #2		41+35				3' RT		0.17	144.4	144.5	144.5		144.5	0.999	144.3	154.9	93.2
2	Section #2		43+20				8.5' RT		0.17	138.0	139.1	138.6		138.6	0.999	138.4	154.9	89.4
3	Section #2		45+80				5.5' RT		0.17	142.5	145.2	143.9		143.9	0.999	143.7	154.9	92.8
4	Section #2		48+20				7' RT		0.17	144.1	144.2	144.2		144.2	0.999	144.0	154.9	93.0
5	Section #2		50+50				3.5' RT		0.17	139.9	141.8	140.9		140.9	0.999	140.7	154.9	90.8

Estimated Density (ρ) =		0.0759 Tons/ft ³	Width (W) =	13ft	Depth (D) =	0.17ft	Sublot Size (S)	200 Tons	Vol. of ACP in Sublot (V) = (S)(ρ) =	2635.0 ft ³	Lot Length to nearest 100' (A) = $\sqrt[3]{V \times 1.35} / \text{Width} \times \text{Depth}$	1190ft			
Beg. Sta.	+		Sublot Ln. [(A) x 0.2] = (L)			238ft	Sta. to Sta.	Enumclaw		ACP Test Temp.		20			
Test	Location Code		Offset				Depth	Gauge Readings			Avg. Reading	Corr. Fact.	Corrected Gauge	Rice Density	% of Rice
1	Section #2		52+75				9' RT	0.17	140.1	141.6	140.9	0.999	140.7	154.9	90.8
2	Section #2		55+10				6' RT	0.17	142.0	143.9	143.0	0.999	142.8	154.9	92.2
3	Section #2		57+35				4' RT	0.17	143.6	143.4	143.5	0.999	143.4	154.9	92.5
4	Section #2		59+60				7' RT	0.17	146.5	145.6	146.1	0.999	145.9	154.9	94.2
5	Section #2		62+15				7.5' RT	0.17	145.8	145.0	145.4	0.999	145.3	154.9	93.8

Remarks: Woodworth paved test section #1 on the plan sheet they planned to pave 1000 tons. The asphalt placed today had 15% RAP and 3% RAS.

APPENDIX F

SE 416th Street Overlay: Shingles in Paving Demonstration Technical Support Document

Skid Resistance Test Results



TO:

Kevin Kelsey
Road Services Division
King County Materials Lab

FROM:

Det. David C. Wells
King County Sheriff's Office
Major Accident Response and Reconstruction Unit - MARR

SUBJECT: RAS PAVEMENT DEMONSTRATION PROJECT—DRY SURFACE
SKID TESTING

SUMMARY:

Kevin,

Pursuant to your request for skid testing at the Enumclaw RAS site on SE 416 Street, between 212 Ave. SE and 244 Ave. On 10-12-2009, I and other MARR detectives contacted at the section of road to be tested. I had your site map which showed that there were four (4) sections of road surface to be tested, broken down into ½ mile sections.

The weather was overcast, windy and dry with a temperature of 54 degrees.

I started the zero (0) distance of the test section at 212 Ave. SE. The first skid tests were completed in what I am calling section #1, which was 0.3 miles east of 212 Ave. SE. Test section #2 was at 0.70 miles east of 212 Ave. SE. Test section #3 was at 1.35 miles east of 212 Av. SE and finally test section #4 was at 1.75 miles east of 212 Ave. SE.

Detectives were driving their normal assigned vehicles, consisting of one 2007 Ford Expedition; one 2005 Ford Taurus, a 2009 Ford Expedition and one 1999 Plymouth Voyager minivan. Tests were conducted using conventional braking and anti-lock braking (ABS) systems. Test speeds ranged from 34-52 MPH. The posted speed limit on SE 416 St. is 45-MPH.

All tests were conducted using either a Vericom VC 2000 or VC 3000 Braking Computer, which is a well established drag factor system used throughout the accident reconstruction industry and one that has been used by the MARR Unit for over 15 years involving thousands of test skids.

The grade was not a factor in any of the test sections as it was less than 1% where the actual skidding was done.

Please refer to the attached table for a breakdown of the test sections; type of vehicle used; average drag factors for both conventional braking and ABS.

CONCLUSION

It is the opinion of the MARR detectives that the test sections all have frictional values that are comparable to regular asphalt road surfaces throughout King County, under dry conditions. Section #3 was the lowest drag factor at 0.67. As an example, to show you the difference; if a vehicle was going 45-MPH and used hard braking all the way to a stop, the stopping distance with the 0.67 would be 101 feet. For a drag factor of 0.75, the stopping distance would be 90 feet.

Additional skid testing is scheduled for early November under wet road conditions.

Please do not hesitate to call if there are any questions

David C. Wells

RAS PAVEMENT DEMONSTRATION PROJECT-KING COUNTY MATERIALS LAB- DRY ROADWAY SKID TESTING TABLE

SECTION	2005 FORD TAURUS			2007 FORD EXPEDITION			2009 FORD EXPEDITION			AVG DRAG FACTOR F=30 ABS	
	VC 2000	"f" NO ABS	"f" ABS	VC 3000	"f" NO ABS	"f" ABS	VC 2000	"f" NO ABS	"f" ABS	"f" NO ABS	"f" ABS
1		0.76	n/a		0.71	n/a		0.68	0.86	n/a	0.8
2		0.76	n/a		0.66	n/a		0.68	0.87	n/a	0.85
3		0.63	n/a		0.73	n/a		0.66	0.83	n/a	0.8
4		0.68	0.83		0.68	n/a		0.71	0.9	0.78	0.89
										0.71	0.83
										0.70	0.85
										0.67	0.8
										0.72	0.89

OVERALL
OVERALL AVG 'f' NO ABS
OVERALL AVG 'f' WITH ABS

0.70 0.84



TO:

Kevin Kelsey
Road Services Division
King County Materials Lab

FROM:

Det. David C. Wells
King County Sheriff's Office
Major Accident Response and Reconstruction Unit - MARR

SUBJECT: RAS PAVEMENT DEMONSTRATION PROJECT—WET SURFACE
SKID TESTING

SUMMARY:

Kevin,

Pursuant to your request for skid testing at the Enumclaw RAS site on SE 416 Street, between 212 Ave. SE and 244 Ave. On 01-04-2010, I and other MARR detectives contacted at the section of road to be tested. I had your site map which showed that there were four (4) sections of road surface to be tested, broken down into ½ mile sections.

The weather was steady rain, with a temperature of 45 degrees.

Per your request, I recorded the stationing ID at each skid location.

I started the zero (0) distance of the test section at 212 Ave. SE. The first skid tests were completed in what I am calling section #1(**stationing ID 25+50**), which was 0.3 miles east of 212 Ave. SE. Test section #2(**stationing ID 47+50**) was at 0.70 miles east of 212 Ave. SE. Test section #3(**stationing ID 83+50**) was at 1.35 miles east of 212 Av. SE and finally test section #4(**stationing ID 105+50**) was at 1.75 miles east of 212 Ave. SE. These locations were virtually identical in location to where the dry skid tests were performed.

Detectives were driving their normal assigned vehicles, consisting of two 2007 Ford Expeditions; one 2006 Ford Expedition and a 2009 Ford Expedition. Tests were conducted using conventional braking and anti-lock braking (ABS) systems. Test speeds ranged from 34-54 MPH. The posted speed limit on SE 416 St. is 45-MPH.

All tests were conducted using either a Vericom VC 2000 or VC 3000 Braking Computer, which is a well established drag factor system used throughout the accident reconstruction industry and one that has been used by the MARR Unit for over 15 years involving thousands of test skids.

The grade was not a factor in any of the test sections as it was less than 1% where the actual skidding was done.

Please refer to the attached table for a breakdown of the test sections; type of vehicle used; average drag factors for both conventional braking and ABS.

CONCLUSION

It is the opinion of the MARR detectives that the test sections all have frictional values that are comparable to regular asphalt road surfaces throughout King County, under wet conditions. Section #3 was the lowest drag factor at 0.65(non-ABS). As an example, to show you the difference; if a vehicle was going 45-MPH and used hard braking all the way to a stop, the stopping distance with the 0.65 would be 104 feet. For a drag factor of 0.75, the stopping distance would be 90 feet. Typically, over the past 15 years we have seen about a 5% to 10% reduction in frictional values under wet conditions versus dry conditions. For today's testing it was a 3% difference. I would consider that an excellent example of the adhesive properties for this asphalt.

Please do not hesitate to call if there are any questions

David C. Wells

RAS PAVEMENT DEMONSTRATION PROJECT-KING COUNTY MATERIALS LAB- WET ROADWAY SKID TESTING TABLE

SECTION	2007 FORD EXPEDITION				2009 FORD EXPEDITION				AVG DRAG FACTOR 'f' NO ABS
	VC 2000	'f' NO ABS	VC 3000	'f' NO ABS	VC 2000	'f' NO ABS	VC 2000	'f' NO ABS	
1	n/a	0.759	n/a	0.825	0.65	n/a	0.671	n/a	0.66
2	n/a	0.82	n/a	0.80	0.656	n/a	0.704	n/a	0.68
3	n/a	0.757	n/a	0.846	0.607	n/a	0.71	n/a	0.66
4	n/a	0.827	n/a	0.83	0.693	n/a	0.77	n/a	0.73
OVERALL									OVERALL AVG
OVERALL AVG									'f' NO ABS
OVERALL AVG 'f' WITH									ABS
									0.68
									0.81